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THE FOUNDRY TRADE JOURNAL IS THE OFFICIAL ORGAN OF THE INSTITUTE OF BRITISH FOUNDRYMEN; THE WELSH ENGINEERS' AND FOUNDERS' ASSOCIATION, AND THE FOUNDRY TRADES EQUIPMENT AND SUPPLIES ASSOCIATION.

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An Appreciation.

After the great effort which was put forward by the Institute of British Foundrymen last year in connection with the International Convention, one might have thought that interest this year would have flagged. But such was not the case, and about 250 visitors made the somewhat trying journey to Middlesbrough and were delighted with the arrangements made for their reception. Mr. F. P. Wilson, the new President, well deserves the honour accorded to him. He worked extremely hard in conjunction with Mr. Goodwin to stage a Convention of the Institute some quarter of a century ago. He co-operated with Mr. Toy and Mr. Ridsdale in launching the Middlesbrough Section of the Institute in 1925, and now, after five years' collaborating with Mr. Harper and Mr. Bashford, he has staged one of the most successful gatherings of foundrymen ever held under the auspices of the Institute. An outstanding feature was the session on steel founding. Unfortunately we could not personally attend this session, but the participants were extremely enthusiastic as to the benefit derived. In commenting on the Leicester Convention some two years ago, we said "the striking absence of members connected with steel foundries minimised the discussion on Mr. Hall's paper. . . ." In view of the success attending this small symposium on steel foundry practice, coupled with the small attendance of people connected with malleable cast iron in the absence of any Paper on the subject, it appears to indicate that specialised sections are worth while even though such extension modifies the traditional make-up of the conference programme. We intend to deal with this phase later, as a special theme.

The works visits were well organised, and showed the founder in the clearest possible manner his connection with large-scale metallurgy and heavy engineering. The foundry industry, whilst expressing their indebtedness to these large Tees-side works, would welcome a still closer co-operation with their technical staff. Not only are the founders their customers wanting service, but they feel that much of the technical information and research existing there could usefully be made available to them by still closer co-operation. We feel sure that under the guidance of the new President, associated with the growth of the Middlesbrough section, the resources of the Institute will be placed at the disposal of Tees-side industry whilst securing for it that close technical collaboration which will benefit the industry as a whole. The Middlesbrough Convention has disseminated the seed in a most fitting manner. Finally, we feel that we are expressing the desires of the visitors by tendering our sincere thanks to the various Tees-side municipal authorities, the organising committees, Dr. Ingall, and the subscribers to the Convention fund, for without this co-operative effort the outstanding success of the Convention could not have been achieved.

The Channel Tunnel.

We gave in these columns some time ago an estimate of the amount of work likely to accrue to the founding industry as a consequence of the construction of the Channel Tunnel, which has a very decided interest to the industry. From the narrower point of view it is rather regrettable that the project has been definitely abandoned by the Government. It is, however, quite impossible to ignore the very lukewarm attitude of the interests consulted, who either condemned it, or, worse still, damned it with faint praise.

Naturally, the military authorities were opposed to it on purely military grounds, but for the first time in the history of the examination of this question, the economic aspect was made paramount. Unfortunately, it is on economic grounds that the scheme proves to be weak. A pilot tunnel, to prove the feasibility of the scheme, would cost five and a-half millions and would take five years. The main tunnel would cost a further twenty-five millions, together with stations, rolling stock, electrical plant and so on. Thirty millions would, in fact, not cover the cost. The cost of passage would be certainly not less than the present cross-Channel rates, so no economy in transport is offered.

The farmers are against it. Industry and trade have not been prepared to give a definite opinion for or against. There is much fear that the Tunnel might facilitate imports of Continental goods. The traveller, as such, does not appear to have been consulted, and the tourist as well as the business man will have to continue to face that vicious strip of water every time he wants to visit the Continent.

The real argument against the Tunnel, of course, apart from the fact that it would contribute very little indeed to the solution of the unemployment problem, is that by the time it is completed it will probably be out of date. Fifty years ago the Tunnel might have been an agent for incalculable good. In ten years' time air transport between England and the Continent will probably be such a commonplace of travel that the Tunnel would be rendered unnecessary. The position, therefore, is that on purely economic grounds there is not sufficient evidence to show that the Tunnel would be a success, and that the Government does not feel justified in licensing its construction. Such a license would be interpreted by the public as a measure of Government approval, and the Government would feel bound to complete the scheme whatever difficulties were encountered, or to find the capital should the original estimates be exceeded. It is doubtful if the project will ever again be raised as a live issue in this country. So we say goodbye to a scheme which might have found much work for the iron-founder.

XUM

Correspondence.

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

Graphite in Cast Iron.

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—Mr. A. Allison, in his very interesting and suggestive article (June 5, 1930, pp. 417-418), suggests that "the precipitation of graphite is produced by the sulphide (manganese sulphide) crystals acting as nuclei" and that manganese sulphide is all-important in this respect. We have, however, in perhaps half-a-dozen different experiments, at different times, added manganese sulphide to melts of "nuclei-free" grey iron—that is to say, to grey iron which would give very fine or "supercooled" graphite in the resulting casting—and have not found it produce any marked coarsening of the general graphite structure. Fig. 1 shows manganese sulphide and fine graphite in a 1.2-in. sand-cast bar. The graphite shown is not the finest possible, but the photomicrograph happened to be already available. In other specimens we have found manganese sulphide associated with the finest possible graphite flakes. It seems that its capacity for producing normal graphite precipitation from a supercooled melt is practically negligible.

Secondly, Mr. Allison shows a 3.9 per cent. silicon pig-iron before and after heating for two hours at 1,050 deg. C., followed by slow cooling, and assumes, because no pearlite is visible after this treatment, that no graphite went into solution at 1,050 deg. C. Is not the correct explanation, however, that the graphite did go into solution at 1,050 deg. C., but was reprecipitated as graphite on slow cooling?

Proof of this is shown in Figs. 2, 3 and 4, which are of three specimens of a pig-iron, similar in composition to that used by Mr. Allison. These three specimens were heated to 1,050 deg. C. for two hours, and that shown in Fig. 2 was then cooled in the muffle, that shown in Fig. 3 was cooled in air, suspended from a wire, and that shown in Fig. 4 was quenched in water. The slow cooling of the specimen shown in Fig. 2 has allowed the carbon, which went into solid solution at 1,050 deg. C., to be reprecipitated as graphite; the more rapid air-cooling of the specimen shown in Fig. 3 has retained most of the carbon, which went into solid solution, in the form of pearlite—which is fine owing to the rather rapid cooling—whilst the water-quenching in the case of the specimen shown in Fig. 4 has retained the carbon in the form of martensite and troostite.—Yours, etc.,

A. L. NORBURY,
L. W. BOLTON.

The British Cast Iron Research Association,
Birmingham.
June 19, 1930.

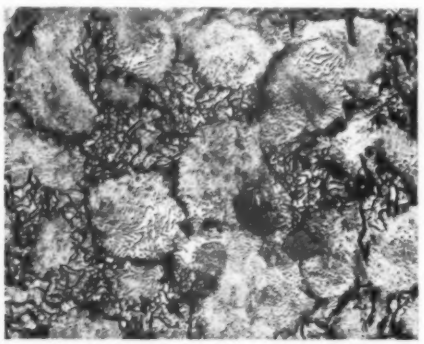


FIG. 1.—FINE GRAPHITE ASSOCIATED WITH MANGANESE SULPHIDE. × 200.

1.2-in. bar, sand-cast. T.C., 2.53; C.C., 0.71; Si, 2.56; Mn, 0.98; S, 0.14; P, 0.09 per cent.

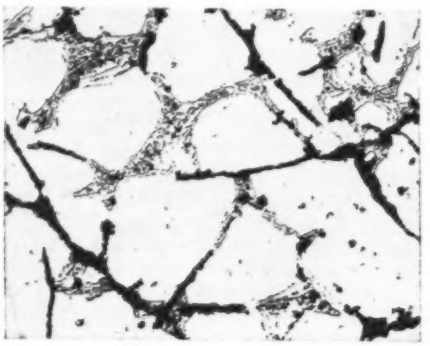


FIG. 2.—PIG-IRON (4.48 PER CENT SILICON) HEATED TO 1,050 DEG. C. FOR 2 HRS. AND COOLED IN MUFFLE. FERRITIC MATRIX. × 200.

T.C., 2.84; C.C., 0.22; Si, 4.48; Mn, 1.0; S, 0.07; P, 1.5 per cent.

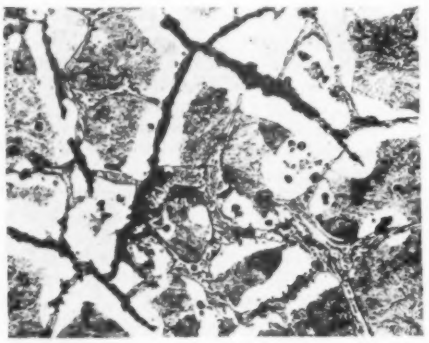


FIG. 3.—SAME AS FIG. 2, EXCEPT MORE RAPIDLY COOLED IN AIR. PEARLITIC AND FERRITIC MATRIX. × 200.

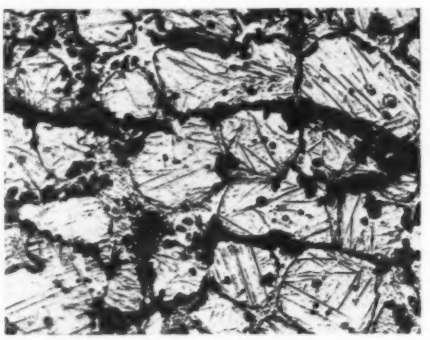


FIG. 4.—SIME AS FIG. 2, EXCEPT QUENCHED IN WATER. MARTENSITIC AND TROOSTITIC MATRIX. × 200.

Imported Refractory Bricks and Machinery Belting.

The Board of Trade announce that Orders in Council were made on June 13 requiring the following imported goods to bear an indication of origin: (1) Strap butts, as from September 13, 1930; (2) machinery belting, as from September 13, 1930; (3) tiles of earth and clay and refractory bricks, blocks and tiles, as from December 13, 1930. The Orders will apply at the time of sale and exposure for sale. In the case of (2) and (3) they will also apply at the time of importation.

Random Shots.

The Middlesbrough Convention has come and gone. As the newly-inducted President, Mr. F. Wilson, J.P., felicitously remarked on one occasion, it was held once again "on the drier side of Britain," an omen which he humorously thought unfortunate for foundrymen. Middlesbrough is the centre of gravity of the great Cleveland area, and is essentially a modern town, although its near neighbour on the west, Stockton, has as old a history as any place could desire. It is said to have been incorporated in 1200, before Magna Carta was signed.

* * *

The great industrial development of the area is evident all the way along the south bank of the Tees, from Stockton, through Thornaby and Middlesbrough to South Bank, and even as far as Redcar. The holding of some events in Stockton and some in Middlesbrough, the visits, and for some people the necessity or preference for accommodation outside the town gave an excellent chance of seeing the extent of the industrial area.

* * *

The Convention itself proved to be a function thoroughly enjoyed by all those who took part in it. It took on the nature of a large family party. Naturally the numbers were smaller than the attendance at the London Convention last year, there was no Exhibition, and there were very few visitors from abroad, distinguished or otherwise, to entertain.

* * *

South Africa had a representative in Mr. Moore, and Australia in Mr. Main. Both were given a warm welcome, and their presence only served to emphasise the family aspect of the gathering.

* * *

When a Convention is distributed over an area rather than concentrated in one spot, good weather is an important ally. In this respect we were fortunate, for we were spared the kind of storm that served to wash out Ascot.

* * *

Other columns will give full details of what actually happened in an official way, but many went back feeling that they had had a good time, made many useful new contacts, and many quiet friendly talks which will prove their value in the next twelve months.

* * *

MIDDLESBREVITIES.

We were impressed by the charming modesty with which Mr. Lambert refused to wear his chain of office while the Mayor was present and wearing his own insignia.

Who left instructions at his hotel to "call at 6 a.m. with Epsom salts"?

Which party, leaving Stockton in the early hours of the morning after the banquet, tried to get to Redcar by way of the transporter bridge, to find that it closed at midnight?

The laugh that greeted the banquet speaker, who said that his sole contribution to founding was, with the aid of his wife, to found a family, was in no way *forced*.

We noticed several little reunions in progress. Several members of the Lancastria Club were there. The Funf Club was represented by M. le President, M. Non-ferrous, and M. le Sydney.

MARKSMAN.

The Founding of Bronze Gear Blanks.

By Francis W. Rowe, B.Sc., M.I.M.M.

(*Continued from page* 464.)

Methods in Centrifugal Casting.

The centrifugal method of casting is adopted for all work up to about 18 in. dia. Above that diameter, whether the castings are made centrifugally depends on the quantities required. If suitable moulds are in stock or a quantity of six or more is required, these are made centrifugally up to a maximum diameter of 3 ft. and a maximum weight of about 500 lbs. There are no real limitations to the centrifugal process being adapted to blanks larger than this, except economic ones. Since the special moulds are made of steel, the expense of a large mould is naturally very high, and the quantity or special requirements of the job must be such as to warrant the expense. Fig. 9 shows one of the largest blanks cast in any quantity to date, this blank weighing 444 lbs. and approximately 36 in. dia.

On the other extreme, the smallest blanks cast centrifugally are about 4 in. dia. Below this diameter the necessary axial speed to secure adequate centrifugal force becomes too high. All the moulds rotate round a vertical spindle. This type of mould had proved to be the most valuable for gear-blank work. In very few instances

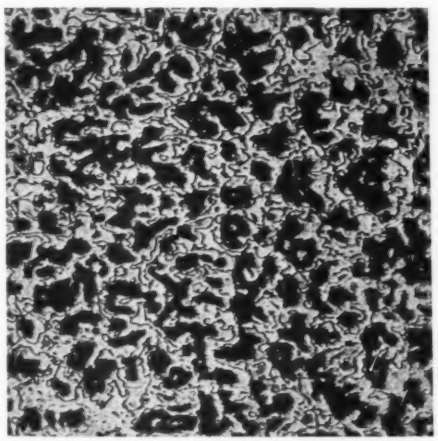


FIG. 7.—STRUCTURE OF CENTRIFUGALLY-CAST BRONZE. × 200 DIAS.

is the gear blank a plain annular ring, and thus cores are necessary to shape the interior. This necessitates adequate support for the core best obtained in a mould on top of a vertical spindle, and direct pouring is used with this type of mould as against trough pouring necessary with a horizontal axis, which would prove extremely difficult if not impossible with small bores.

As the largest face width of blanks suitable for centrifugal casting is about 6 in., no difficulties are experienced with undue height of mould or with metal failing adequately to fill the mould from a central or bottom pouring orifice. The horizontal-axis mould undoubtedly presents many advantages, and is the one most suited for pipe casting and the like, but is not easily applicable for gear work.

The moulds are of steel. Numerous experiments have been made with various grades of cast iron, but so far none has been found suitable for this work. The chief objections to cast iron are that its strength is unsuitable for the heavy duties, and that it frequently fails through cracking due either to rapid fluctuations of temperature or shock in ejecting a "sticker" casting. Also, the surface of the mould disintegrates more rapidly than a steel mould properly treated, particularly that portion of the mould forming the periphery of the blank. Cast iron also, particularly when in an initially-heated condition, is considerably more liable to cause blow-holes on the surface of the casting than is steel. That is, the metal will not lie or solidify quietly against a hot cast-iron mould. The steel moulds, before being put into active production work, are carefully treated to prevent welding-on of the hot bronze and to secure a surface against which the metal will lie quietly. This problem of securing a surface to which the bronze will not adhere is much more difficult with centrifugal castings in the alloy used than in what might be thought to be analogous types of die castings.

Being a chill mould, the casting temperature has necessarily to be higher than for sand castings. In practice the casting temperature employed varies from 1,230 to 1,290 deg. C. With a lower casting temperature there is considerable danger of partial solidification before the mould is completely filled, resulting in what may be termed a partially-laminated casting; that is, a casting which shows on breaking a faintly discernible or plainly discernible "stripe" effect, depending on how much the casting temperature or pouring conditions have been in error.

This high casting temperature, together with the force with which the metal is flung against the walls of the mould, and the fact that the metal washes against the mould (new unchilled metal being brought in contact with previously-heated surfaces), all tend to raise the surface to a much higher temperature than occurs in a stationary die mould, and increases the risk of welding-on and tends to create a condition in which the metal will bubble against the surface during the whole period of solidification. Pre-treatment of the moulds is, therefore, necessary; and regulation of initial temperature of the moulds is necessary, it being unwise to cast with an initial mould temperature more than 350 deg. C. for light work or more than 275 deg. C. for heavier work.

A pit contains the driving mechanism for a series of moulds on top of it, driven by one variable-speed direct-current motor. These pits house all the bedplates, driving gears and bearings, change-speed gears, brakes and clutch mechanisms, only the mould proper being above ground. Since the lower rotating edge of the mould is only an inch or so above the ground, the orifice in the sheet-metal guard is at a convenient height for pouring.

The cores are made from sea sand and a special binder, and must have great mechanical strength to withstand the heavy wash of the metal and the heavy centrifugal force. To secure this necessary mechanical strength great care has not only to be paid to the mixing of the core sand, but also to the drying, temperature and time. Core drying is done in a special August stove and temperatures recorded on a Cambridge thermograph. After drying, the cores are given two coats of a special refractory wash to prevent erosion due to the cutting action of the metal and its phosphorus content. Metal is conveyed from the four tilting reverberatory furnaces by means of an interconnected overhead runway, which serves to carry the special tackle for closing the moulds and ejection of the castings.

Pouring of Centrifugal Castings.

Pouring of centrifugal castings requires more skill and care than ordinary sand castings, as a splash at the commencement or a break before the mould is completely filled is of greater seriousness. Small splashings at the commencement of pouring immediately solidify and form detached pellets embedded in the surface of the casting. The pouring must commence at the full rate and continue steadily until the runner is full. A pause in the pouring then occurs to allow a certain amount of liquid contraction to take place, and the runner is filled up again and the mould left rotating until complete solidification takes place. The liquid contraction which takes place, due to rapid solidification and centrifugal action, is very large, and is reflected in the extremely high density of the finished casting—8.8 to 8.9—probably the maximum of which the alloy is capable.

To secure easy ejection of the finished casting, particularly when the sides are roughened with continued use, the moulds are made with a slight amount of taper. After ejection, the cores and runners are punched out whilst the castings are hot, and the castings sandblasted and finally dressed. Whilst the centrifugal method of casting must of necessity be rather more expensive than sand casting, due to the costly nature of the moulds, the extra care needed in core-making and the initial cost of the plant, a well-designed plant is capable of great rapidity of output. To give a specific example, the particulars given in Table I are detailed times for making 56 castings, using one pouring, setting and ejecting gang.

Practical Advantages of the Centrifugal Casting.

Apart from the special metallurgical features of the centrifugal casting, previously mentioned, the process possesses other advantages not perhaps so apparent at first sight. A well-made modern gear demands machining of great accuracy, and the machines and cutters are necessarily expensive and the machining costs high.

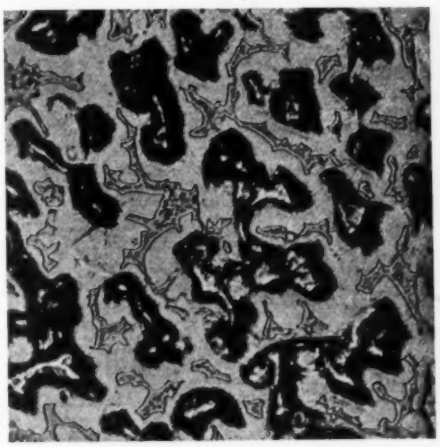


FIG. 8.—STRUCTURE OF CENTRIFUGALLY-CAST BRONZE. × 500 DIAS.

If, therefore, a gear blank has to be scrapped at a late stage in manufacture due to defects in the material revealing themselves, the loss involved is much more serious than merely the cost of making of the blank or casting.

The chief trouble experienced previously with sand or even chill castings was that defects were most likely to occur at a late stage in manufacture, *i.e.*, on finish cutting the teeth slight porosity and weakness revealing itself at the roots of the teeth. Where one is working to an extremely high standard this necessitates a large and costly amount of scrap. With the centrifugal process any defects are surface defects, revealed either in the dressing shop or during the first rough-turning operations, so that the total losses due to waster castings with a rigid inspection are materially lighter than with the sand or chill-sand castings.

Another feature of the centrifugal process is the less variation between one casting and another, and between large and small castings. All foundrymen and metallurgists are aware of the variation in physical characteristics, hardness, density, etc., between a bronze casting of, say, 1 sq. in. section and 16 in. sq. section. The difference in centrifugal castings of this variation is very considerably less. Finally, of course, there is the service test of the centrifugal casting. Since early in 1927, when the

production of centrifugal castings was first commenced on a large-scale commercial basis, sufficient experience has been accumulated to demonstrate the superiority of this class of casting over the sand and chill casting in increased load-carrying capacity, greater durability and general freedom from service failures.

Other Types of Gear Castings.

The centrifugal process, as the author outlined previously, has only been so far adapted to castings up to 36 in. dia. and approximately 500 lbs. weight, for reasons detailed. Above this weight, or where for some special feature of design the centrifugal process cannot be applied (which is, however, infrequent), more usual moulding methods have to be employed. In these, nevertheless, the experience accumulated and researches undertaken during the development of the centrifugal process have proved of immense value in improving the methods and qualities of the sand castings, as, of course, would be naturally expected.

To compensate for the inherently and inevitably lower density and hardness of the sand casting, modifications in the composition of the metal are made to reproduce in a lesser degree

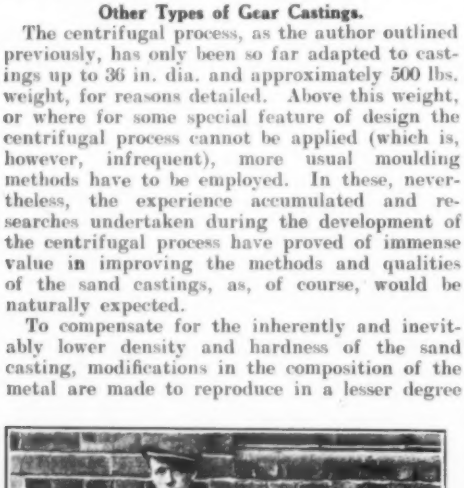


Fig. 9.—Large Worm-wheel Blanks cast centrifugally.

the features associated with the centrifugal casting. For instance, the growth of large crystals and resulting large grain-size associated with the sand casting can to some extent be lessened by proper appreciation of the mechanics of solidification. As with all types of crystallisation, large crystals are promoted by slow crystallisation and also by widely-separated starting points or nuclei of the crystals. If a solution approaching the point of crystallisation or a metal approaching the temperature of solidification contains dispersed within it numerous starting points for crystallisation, the number of grains or crystals in the final solidified or crystallised mass will be more numerous than if these nuclei or cells were present in a smaller number.

Consequently, the greater the number of crystals or grains in a given volume, the less the average grain-size. Thus, while small grain-size and high density can be secured by increasing the rate of solidification by three means previously described: (*a*) Low casting temperature, (*b*) chilling, and (*c*) constant agitation during solidification, it can also be to some extent achieved by "dosing" or inoculating the alloy so that prior to the main solidification taking place the alloy contains numerous evenly and finely-dispersed nuclei to form centres of crystallisation.

The lowest casting temperature which can be successfully and practically employed depends on several factors, many of which the author will not reiterate in detail as they were discussed in an earlier Paper on non-ferrous metallurgy presented to the Institution a few years ago. Chief amongst these, however, are the size and disposition of the runners, the distance the metal has to travel and the temperature and condition of the mould.

By logically and carefully correlating these various factors experience can be built up which will permit of a casting temperature which, on account of its proximity to the solidus of the alloy, would result in drawn, blown or otherwise unsound castings with other mould conditions.

Casting temperature for bronze, like many other features in a foundry, is a factor which *per se* means but little and must be studied with and correlated to other relevant conditions influencing rate of solidification.

The author had hoped to be able to include in this Paper descriptions of a further important innovation in the founding of gear blanks, but, unfortunately, the method has not yet reached the fully commercialised stage of development which would justify publication. In conclusion, the author would like to express his sincere thanks to the directors of Messrs. David Brown & Sons, the gear specialists, of Huddersfield, for permission to publish this Paper, the whole of the data for which was obtained in their foundries and laboratories, and to his colleagues —and in particular Mr. E. Herrod, the bronze-foundry foreman—without whose active co-operation and assistance these results would not have been achieved.

Table I.—*Data of Centrifugal Casting.*

Weight of each casting	34 lbs.
Total number cast	56
Number of moulds	4
Total time	128 min.
Average time per blank... ...	2 min. 6 sec.
Average time per cast of four ...	8 min. 24 sec.

I.B.F. Elects New Members.

At a meeting of the Council of the Institute of British Foundrymen, held at the Constantine Technical College, Middlesbrough, last Tuesday, the following were elected to the various grades of membership:—

As Members.

T. G. Bamford, M.Sc., principal, County Technical College, Wednesbury; A. Barton, director, Providence Foundry, St. Helens; F. Bethell, works manager, G. Bethell & Company, Stockport; W. E. Box, technical adviser, Rapid Magnetting Machine Company, Birmingham; W. T. Griffiths, M.Sc., manager, Research and Development Department, Mond Nickel Company, Limited, London, S.W.1; C. Handford, M.Met., lecturer in metallurgy, College of Technology, Manchester; H. E. King, works manager, Manlove, Alliott & Company, Nottingham; T. H. Moorwood, director, Edgar Allen & Company, Limited, Sheffield; J. T. More, engineers' agent, 11, Rothwell Street, Glasgow; J. Sharples, metallurgist, Sheepbridge Stokes Centrifugal Castings Company; A. E. Perry, foundry manager, Dewrance & Company, London; J. G. Hodgson, iron agent, Swan Bros., Middlesbrough; E. C. Swan, iron agent, Swan Bros., Middlesbrough; J. T. Blackett, managing director, Blackett, Hutton Company, Guisborough; V. A. G. Lambert, foundry manager, Hythe Bridge Ironworks, Colchester; W. T. Main, ironfounder, T. Main & Sons, Melbourne; P. L. Martyn, managing director, Steel Company of Australia, Pty.

As Associate Members.

R. J. Blakey, General Refractories, Limited, Sheffield; E. W. Blenkinsop, analytical chemist, Head, Wrightson & Company; J. C. Charlton, foreman patternmaker, Richardsons, Westgarth & Company, Limited; W. P. Emmett, foundry foreman, Buenos Aires Western Railway Company; A. Jackson, foundry foreman, J. H. Burgess, Barnstaple; R. A. Pugh, assistant foundry manager, J. D. Jackson Buckle Company, Walsall; C. Renwick, foundry foreman, Babcock & Wilcox, Lincoln; W. Fearnside, foundry manager, Albert Foundry, Keighley; W. Peake, moulder, Pease & Partners, Middlesbrough; A. Richardson, foreman moulder, W. Shaw, Limited, Middlesbrough.

As Associates.

J. Addy, J. Addy & Son, Huddersfield, and E. W. Pugh, Wm. Charles, Wednesbury.

A Novel Portable Combined Sand Hopper and Riddle Plant.

Messrs. Ritchie, Hart & Company, Limited, iron and brass founders, of 18, Mountpottinger Road, Belfast, have recently designed a useful portable sand hopper and riddle combined

Fig. 1.—Sand being Fed into the Riddle of the Machine.

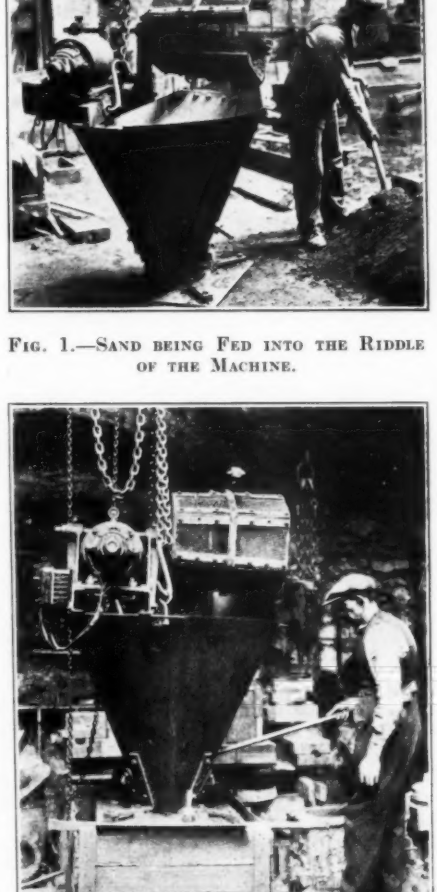


Fig. 2.—Riddled Sand Discharged Directly from the Hopper into Bin.

as one unit. Its general appearance is shown in Figs. 1 and 2. In the former, the sand, either floor or new, is being fed into the riddle, whilst the latter shows the sand being discharged into a bin adjacent to a moulding station. The sand is discharged from the bottom by means of a bar inserted through a hole in the side of the hopper. The machine is driven by a 1-h.p. motor and worm gearing, and is, as shown, entirely self-contained. In smaller foundries, where an elaborate sand-preparing plant is beyond the range of practical economics, the installation of such a unit as has been described should make for more orderly, better and cheaper production.

INSTITUTE OF BRITISH FOUNDRYMEN.

TWENTY-SEVENTH ANNUAL CONVENTION AT MIDDLESBROUGH.

The twenty-seventh Annual Convention of the Institute of British Foundrymen was held on Teeside from Tuesday, June 17, to Friday, June 20, under the presidency of Mr. F. P. Wilson, J.P. There were about 250 members and visitors. An admirable programme had been arranged for their instruction and entertainment, which included the reading and discussion of Papers, works visits and social functions. The ladies' programme was as usual an outstanding feature of the Convention.

TUESDAY, JUNE 17.

In the afternoon, the various committees met, whilst in the early evening a meeting of the General Council was held. These were followed by a reception in the Constantine Technical Colleges, the visitors being received by Mr. and Mrs. William Shaw. Mr. Shaw is the President of the local section, and on his left were Dr. and Mrs. Ingall. The doctor is the Principal of the College, and he had arranged for his staff and students to conduct parties through the numerous laboratories and workshops. The equipment has been particularly well chosen so as to emphasise modern practice, yet still capable of adequately expressing the simple underlying principles of engineering, metallurgy and foundry practice. On every side one heard congratulatory comments on the enterprise and intelligent appreciation shown in the equipment made available to the students.

Following the inspection, an excellent concert was provided, during which a buffet supper was served.

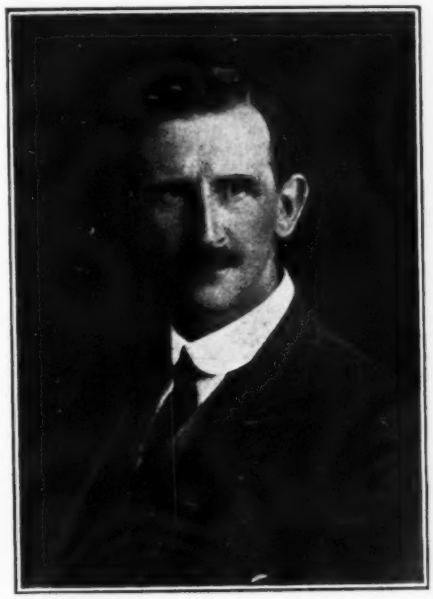
WEDNESDAY, JUNE 18.

The business of the Convention opened on Wednesday morning, June 18, at the Constantine Technical College, Borough Road, Middlesbrough, Mr. Wesley Lambert (retiring President) in the chair. He was accompanied on the platform by His Worship the Mayor of Middlesbrough (Alderman Thos. J. Kedward), Mr. Fred. P. Wilson, J.P. (President-elect) and Mr. A. Harley (Vice-President).

The retiring PRESIDENT, opening the Convention, recalled that the Institute (then known as the British Foundrymen's Association) had held its third Annual Convention at Middlesbrough on Tuesday and Wednesday, August 7 and 8, 1906, and said that he had been handed a report of the Proceedings of that Convention. In those circumstances he felt sure the members would have a very sympathetic feeling towards this twenty-seventh Annual Convention.

Civic Welcome.

HIS WORSHIP THE MAYOR OF MIDDLESBROUGH (Alderman Thos. J. Kedward), who was introduced by Mr. Lambert, extended to the members of the Institute and the visitors, on behalf of the citizens of Middlesbrough, a very hearty welcome to the town—a duty which, he said, afforded him the very greatest pleasure. He expressed the hope that those attending the Convention would find the atmosphere such that it would make the work they had to do both pleasurable and instructive. In referring to the air of Middlesbrough, he did not seek to give the impression that he was advertising Middlesbrough as a health resort; much might be said for it in that respect, but he was not quite sure that he would be able to justify the claim to the utmost extent. The climate in this town in the spring, especially when the north-east winds prevailed, might be described both as vigorous and searching, and those who could respond to its influence would return to their homes like giants refreshed. To those who would only react to a milder and more congenial atmosphere, he could only say that the Middlesbrough atmosphere would give them an added reason why they should find pleasure in leaving it behind. (Laughter.) The members of the Institute had selected for the purpose of their Convention an industrial town, and, therefore, in their peregrinations about the place, they would not be disappointed if it were not what they would regard as the highest poetic ideal of an Arcadia. It was not usual to erect blast furnaces and ironworks in the midst of suburban areas, for the reasons that, in the first place, they were not regarded as æsthetic, and secondly, the atmosphere they created was not regarded as congenial.



MR. F. P. WILSON, J.P.

(The recently elected President of the Institute of British Foundrymen.)

Mr. Wilson was born at Middlesbrough. His father was Alderman John Fredk. Wilson, one of those associated with the early days of the iron trade in Cleveland. The President was educated at Middlesbrough High School and Giggleswick Grammar School. He served an engineering apprenticeship with Tees-side Engine Works and Robt. Stephenson & Company, Limited, Newcastle. He then entered the service of Wilsons, Pease & Company, Tees Iron Works, in 1892, and later became assistant blast-furnace manager, and had special experience in designing and working slag wool plant. Next he became foundry manager, the firm becoming Pease & Partners. Mr. Wilson is a Justice of the Peace for Middlesbrough, a member of the Education Committee and of the Governing Council of the Constantine Technical College. He is also a Governor of the High School and the Kirby Secondary School. Amongst other public activities he is the Honorary Director of Cleveland Scientific and Technical Institute, a past-President of the Cleveland Institution of Engineers and of the Middlesbrough Y.M.C.A. He is president of the local branch of the League of Nations Union. It is interesting to note he founded the first company of the Boys' Brigade in Middlesbrough in 1892. An officer of the Order of St. John of Jerusalem, an Assistant Commissioner, St. John Ambulance Brigade, and Assistant County Controller for N. Riding of the V.A.D. scheme, complete his activities.

Some statistics concerning the borough might be of interest to those who were visiting it for the first time. The area of the borough comprised 4,323 acres, its population was estimated at 135,000, its rateable value was £672,000, the product of a penny rate was about £2,300 and the rate levied for the current year was 15s. in the £. In 1853, when the town had obtained its Charter of Incorporation, the inhabitants had numbered 9,300. A simple calculation would show, therefore, that in less that 80 years the number of inhabitants of the town had been multiplied over fifteen times. The town was bounded on the northern side by the River Tees, which formed a very definite and unmistakable boundary line and which separated the county of Yorkshire from the County of Durham. Access from one bank of the river to the other was provided by a bridge of a type which was not at all common either in this or any other country, *i.e.*, the Transporter Bridge, which would probably be of great interest to the visitors, who were so often interested in such construction. It was erected at a cost of about £91,000; it was opened in 1911 by the Duke of Connaught and, as illustrating its utility, His Worship mentioned that during 1929 it had carried between the banks of the river 5¼ millions of people and thousands and thousands of motor-cars, motor-cycles and other vehicles. As would be expected, the blast furnaces, ironworks and foundries were found on the banks of the Tees, or in very close proximity to them. There was very close at hand the London and North Eastern Railway, and a wet dock, of a commodious character, from which there traded in and out a great many vessels carrying merchandise to and from all parts of the world.

Referring to the municipal buildings, in which the citizens of Middlesbrough had a good deal of pride, he said that they were erected some 41 years ago, when the dimensions of Middlesbrough were much smaller than at present. There was a great deal to be said for the foresight and courage of the local legislators in providing such a pile of buildings, because at the time of their construction there seemed to many people to be little hope of their being used fully; to-day, however, the buildings are charged to their fullest capacity for the purpose of the government of the town. They were erected at a cost of £92,000, and it would be appreciated that if such a pile of buildings could be erected at that price to-day it would be regarded as a very economical proposition.

Amenities of Middlesbrough.

Another of the town's endowments was the Dorman Museum, which was given to the town by a citizen, who, he was very pleased to say, was still alive and resident in the district—Sir Arthur Dorman. (Applause.) It had been erected in memory of Sir Arthur's son, who had fallen in the South African war, and it contained many exhibits which were both interesting and instructive.

When one stepped out of the Dorman Museum one was at the precincts of another great gift to Middlesbrough, *i.e.*, the Albert Park, which was presented to the town as far back as 1868. At that time Middlesbrough did not reach out as far as that park, which latter seemed to be far away from the dwellings of the people. It had proved to be an inestimable boon to Middlesbrough, and, as the result of Middlesbrough's growth, the park is now in the midst of a densely populated area.

Another gift to the town—and he mentioned these matters because he was giving the visitors an itinerary—was the Stewart Park, about two miles from the town, but easy of access by bus, and the people of Middlesbrough in the future would find it of great benefit to them, as they would also the other gifts he had mentioned. Marton Hall, with the great park surrounding it, had been originally the residence of Mr. H. W. F. Bolckow, the founder of the iron industry in Middlesbrough. Mr. T. D. Stewart—who, he was pleased to say, was still alive and resident in the town—was the donor of that great park to Middlesbrough. One of the dominant features of interest there was a space, on the south side, on which had stood the cottage in which the great navigator, Captain Cook, had been born. The park covered 134 acres.

Constantine Technical College.

The last and the greatest gift in money value to Middlesbrough was the Constantine Technical College. No greater or grander monument could any man have conceived by which to perpetuate his name in the town in which he had been for so long resident. It was due to the late Mr. Joseph Constantine, and it constituted a magnificent pile of buildings which would commemorate his name and were consecrated to public education. Middlesbrough looked forward to the great work which would be done in that institution and to the results which would follow. There had been presented to the youth of the town and the district for the first time a great open door, conveniently set for all who desired to make progress, and through which they would find access to great sheaves of knowledge which were waiting to be garnered by them. All would agree that the future would make greater and greater demands on the youth of this nation than had the past; Middlesbrough looked forward with anticipation to the development of the college as a great centre of education, and hoped that very many of its students would occupy great and honoured positions in the nation, and would direct scientific, technical and industrial opinion along the right channels. Standing as we did upon the threshold of the future, facing problems such as this country had never before been called upon to solve—problems the solution of which would demand the exercise of the greatest brains cultivated on scientific lines—it was for the municipal authorities throughout this country to provide the means by which the proper education could be gained and by which talent could be developed. In the Constantine Technical College, Middlesbrough sought to make a beginning. He understood that special classes would be formed for the tuition of future foundrymen. It was intended to develop within the precincts of that building work which must be regarded as of a pioneer character.

In again extending a very warm welcome to the visitors, His Worship expressed the hope that the Convention would be entertaining and instructive, and that it would be one of the most successful the Institute had ever held; he trusted also that when they left the district for their homes they would carry away with them the pleasantest of memories of their visit.

The Oliver Stubbs Gold Medal.

The RETIRING-PRESIDENT invited His Worship the Mayor to present the Oliver Stubbs Gold Medal, which was provided by the National Iron Foundry Employers' Federation for presentation by the Institute each year to encourage and reward efforts made by members of the Institute to impart knowledge to their fellow-members on the practice and theory of founding. (The medal bears the name of Mr. Oliver Stubbs, a Past-President of the Institute.) It was awarded on this occasion to Mr. James Ellis (one of the first Presidents of the Institute) for sterling work generally in connection with the Institute, and more particularly his efforts to encourage the Junior Section.

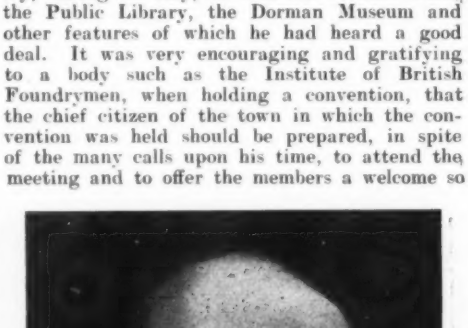
HIS WORSHIP THE MAYOR, in presenting the medal to Mr. Ellis, said it was a great pleasure to hand it to one who had distinguished himself so greatly, and he had no doubt that Mr. Ellis would prize it, not so much for its intrinsic value, but as a reminder of his valuable work, which he and his family would look back upon with the greatest pleasure and pride.

The medal was presented amid great applause.

MR. ELLIS said he could not express adequately how proud he was, as one who had been a founder of the Institute, to receive this medal from the hands of the Mayor of Middlesbrough. He would prize it in the future, not merely for its intrinsic value, but particularly by reason of the motive that had actuated his fellow-members in awarding it to him. He was, indeed, grateful.

A Vote of Thanks to the Mayor.

The RETIRING-PRESIDENT proposed a very hearty vote of thanks to His Worship the Mayor of Middlesbrough for the warm welcome he had extended to the Institute and for his very edifying address. The members would wish to take advantage of the itinerary His Worship had mapped out for them, he said, and undoubtedly they would leave Middlesbrough with many pleasant recollections and an appreciation of its many interesting features. Although he himself had travelled a good deal in this country, this was the first occasion on which he had visited Middlesbrough; perhaps he had lost a great deal thereby, but at any rate he would try, during his stay, to visit the Stewart Park, the Public Library, the Dorman Museum and other features of which he had heard a good deal. It was very encouraging and gratifying to a body such as the Institute of British Foundrymen, when holding a convention, that the chief citizen of the town in which the convention was held should be prepared, in spite of the many calls upon his time, to attend the meeting and to offer the members a welcome so warm as that which had been extended by the Mayor of Middlesbrough. In conclusion, Mr. Lambert said that it did not require a long speech to commend the proposition that a vote of thanks be accorded the Mayor, and it would be appreciated that, though his speech was brief, it was none the less sincere.



MR. A. HARLEY.
(Senior Vice-President.)
(Mr. Harley's Biography appears on page 484.)

MR. FRED. P. WILSON, J.P. (President-Elect), seconding, said he was sufficiently acquainted with His Worship to know that he would not place less value on a vote of thanks to him because the speeches of those who proposed and seconded it were not long. The Mayor was a businesslike man, who knew how a meeting should be conducted, and appreciated the value of brevity. It was a pleasure to second the vote of thanks to him.

The vote of thanks was carried with acclamation.

HIS WORSHIP THE MAYOR, in his response, said it was a pleasure to him to welcome the members of the Institute to Middlesbrough, which he assured them was a hospitable town. It might be that those who had visited the town for the first time had had certain preconceptions. The approaches by the railway were not of the most salubrious, but one must not expect to find, in ironworks and blast furnaces, very much that would appeal to one's æsthetic taste. Finally, he again wished the Institute a successful Convention.

The Mayor then withdrew.

ANNUAL GENERAL MEETING.

The business of the annual general meeting of the Institute was then proceeded with.

Annual Report.

The General Council has much pleasure in submitting for the approval of the members at the 27th annual meeting, their report on the work of the Institute for the year 1929-30, and the financial statement for the year 1929.

Roll of the Institute.

During the year three subscribing firms, 68 members, 111 associate members and 25 associates have been elected, making a total of 207.

The membership roll has recently been drastically revised, and the names of non-paying members have been erased. The losses due to this revision and to resignations and deaths amount to 185; there is, therefore, a net increase of membership of 22. It is pleasing to note that of the members on the roll, eight have been transferred to higher grades during the year.

The membership roll on April 30 last was made up as shown in the following table:—

Honours Conferred on Members.

The Council tender their hearty congratulations to Prof. H. C. H. Carpenter, F.R.S., hon. member, who has received the honour of knighthood.

Finance.

The statement of accounts has been duly audited and certified by Messrs. J. & A. W. Sully & Company, and is included with this report.

Of the increased expenditure, approximately £200 represents special expenses due directly or indirectly to the international character of the Conference held in June, 1929. This increased expenditure consists of the cost of printing preprints of an exceptionally large number of Papers, charges for interpreter, translations and other special expenses, and also a proportion of the cost of Volume XXII of the "Proceedings," which was unusually large and expensive, due to the amount of space occupied by the Papers given at the International Conference. In spite

	Subscribing Firms.	Members.	Associate Members.	Associates.	Total.
Birmingham, Coventry and West Midlands	2 (2)	98 (88)	115 (95)	23 (19)	238 (204)
East Midlands	5 (4)	44 (40)	92 (83)	1 (2)	142 (129)
Lancashire	7 (9)	106 (115)	185 (197)	9 (9)	307 (330)
London	5 (4)	150 (139)	88 (87)	12 (11)	255 (241)
Middlesbrough	4 (5)	18 (26)	38 (34)	4 (6)	64 (71)
Newcastle	9 (10)	49 (59)	46 (49)	89 (89)	193 (207)
Scottish	3 (2)	69 (64)	151 (131)	22 (29)	245 (226)
Sheffield	6 (6)	78 (84)	68 (78)	8 (11)	160 (179)
West Riding of Yorkshire	—	69 (28)	52 (53)	2 (1)	88 (82)
Wales and Monmouthshire	1 (1)	27 (29)	33 (27)	1 (4)	62 (61)
Unattached	—	33 (35)	10 (10)	1 (1)	44 (46)
Total	42 (43)	706 (707)	878 (844)	172 (182)	1,798 (1,776)

The figures in brackets are for the year ending April 30, 1929.

of this increased expenditure, it is satisfactory to note that there is an excess of income over expenditure of £98 17s.

International Congress.

The outstanding event of the year was the 26th Annual Convention, which also formed the third of the series of triennial International Foundry Congresses.

The proceedings commenced on May 20 with the arrival in London of a large body of members of the American Foundrymen's Association and their ladies, who were entertained in London for several days. On May 27 they were joined by several delegates from Continental associations, and left London on a twelve days' tour of the principal centres of industrial and scenic interest. In all centres which were visited they were entertained by the various branches of the Institute.

The Conference proper was opened by the Rt. Hon. the Lord Mayor of London in the Grand Council Chamber of the London Guildhall on June 11. The Lord Mayor, who was attended by the City Mace Bearer and City Sword Bearer, welcomed the delegates and presented the Oliver Stubbs Medal to Mr. Wesley Lambert. He also presented a medal to Prof. Thomas Turner as a permanent souvenir of the testimonial which had been presented to him previously by members of the Institute and members of the British Cast Iron Research Association. Later in the day members, delegates and ladies attended a reception in the Guildhall by invitation of Sir John Dewrance. Subsequent meetings of the Conference were held at the Institution of Mechanical Engineers.

The Conference was attended by over 600 delegates and ladies, representing 14 nationalities.

An International Foundry Exhibition under the auspices of the Foundry Trades Equipment and Supplies Association was held at the Royal Agricultural Hall during the Conference period. An important feature of the Exhibition was the technical exhibit which was organised by the various research associations and universities.

The thanks of the Institute are due to the Lord Mayor and the Corporation of the City of London; to the President and Council of the Institution of Mechanical Engineers; to the Councils and members of the various Branches who entertained visitors during the tour; to the Foundry Trades Equipment and Supplies Association; to the universities and research associations for their co-operation in organising the Technical Exhibit; to the Council and members of the London Branch of the Institute, and to Mr. H. G. Sommerfield, hon. secretary of the London Conference.

Educational Activities.

In the last annual report it was stated that satisfactory progress had been made towards the establishment of national certificates in foundry practice; substantial further progress has since been made. The Institution of Mechanical Engineers, in conjunction with the Board of Education, has agreed to initiate a modification of the Institution's national certificate suitable for students of foundry practice. This certificate will be signed by the President of the Institution of Mechanical Engineers and endorsed by the President of the Institute of British Foundrymen, and it is expected that it will be a national diploma of high technical standard, which will be recognised as a high-grade professional qualification in foundry practice.

Many of the technical colleges who prepare students for the Institute of Mechanical Engineers' National Certificates are now in a position to arrange courses suitable for the modified foundry certificate when the demands arise in their respective areas. Members are urged to use their influence with students of foundry practice to take full advantage of these facilities.

Considerable progress has also been made towards the arrangement of a craft certificate in foundry practice of a national character. This certificate is intended for students who are taking courses of a less technical and more practical nature than those which prepare for the national certificate previously described, and it is hoped to arrange for the issuing of these certificates under the auspices of the City and Guilds of London Institute, which is a national examining body of the highest standard and of considerable experience.

An Advisory Committee has been formed to assist in the drafting of syllabuses and other arrangements, and the Institute is represented on this Advisory Committee by members of its Education Committee. Various national educational bodies, who will be concerned with the preparation of students and the arrangement of classes, are also represented.

The General Council is convinced that these steps will result in the near future in the consolidation and extension of training in foundry practice.

A full-time course in foundry practice, covering a period of two years, is being organised in connection with the new Constantine Technical College in Middlesbrough. It is hoped that students from every part of the country will enrol for this course. The Institute is represented on the Advisory Committee established in connection with the course, by Mr. F. P. Wilson, President-elect, and by Mr. Wm. Shaw, President of the Middlesbrough Branch.

MR. VICTOR STOBIE, M.I.E.E.

(Junior Vice-President.)

(A biography of Mr. Stobie appears on page 478.)

Oliver Stubbs Medal.

The eighth award was made in June, 1929, to Mr. Wesley Lambert, A.K.C., who is now President of the Institute, "in recognition of his long and valued services to the Institute of British Foundrymen, and for his valuable contributions to non-ferrous foundry practice."

The medal was presented to Mr. Lambert by the Rt. Hon. the Lord Mayor of London at the opening meeting of the International Conference, and it is a pleasing coincidence that the presentation coincided with Mr. Lambert's installation as President of the Institute.

Diplomas.

Four diplomas were awarded in June, 1929, for Papers given before the Branches during the previous session. The recipients and the respective Branches before which the Papers were given are as follow:—

D. H. Wood, Birmingham Branch; B. Hird, East Midlands and Newcastle Branches; E. Longden, Newcastle Branch; W. McCulloch, Scottish Branch.

The announcement of the awards of diplomas for the session 1929-30 will be made at the annual general meeting on June 17.

Buchanan Medals.

The first awards of the Buchanan Medals for members of the Junior Sections were announced at the conference in June. The awards were as follow:—

Norman C. Blythe, Scottish Junior Section; John Hird, Birmingham Junior Section; J. Eric Garside, Lancashire Junior Section.

Surtees Memorial Examinations.

These examinations are held by the Newcastle and Scottish Branches, and prizes are awarded from a bequest left by Mr. W. Mayer, Past-President of the Institute. The 1930 examinations were conducted by the Scottish Branch, and the awards were as follow:—

Senior Grade:—Norman C. Blythe, gold medal; Robert MacNab, prize; Thomas Davis, prize.

Junior Grade:—David Webster, silver medal; John Darby, prize; Isaac Wilson, prize.

John Wilkinson Medal.

The examination for the John Wilkinson Medal, conducted by the Lancashire Branch, Junior Section, was won by Mr. L. C. Topham.

"Proceedings."

Volume XXII of the "Proceedings," covering the session 1928-29, and the conference in June, 1929, has now been issued, and copies have been sent to all members whose subscriptions are not in arrears. This volume is the largest which has been published, as it contains nearly 1,000 pages.

No less than 450 Papers have been published in the first twenty-two volumes of the "Proceedings," of which 132 have been given at conferences and the remainder have been presented at the various Branches. These figures do not include presidential addresses and discussions.

Re-arrangement of General Council Committees

An important step has recently been taken by the General Council which it is anticipated will result in a considerable increase in the technical activities of the Institute.

For some considerable time the work of the Literary Awards and Education Committee has been growing rapidly, and a multiplicity of duties has been delegated to this committee and its various sub-committees. At the same time, it was seen that much of the work for which the Test Bar Committee was formed had been successfully completed, and the General Council has decided to re-arrange the duties of these two committees.

The original Literary, Awards and Education Committee will now be known as the Literary and Awards Committee, and will be responsible for the selection and publication of Papers and the distribution of awards.

The Educational Sub-Committee has been formed into an Education Committee, and will be responsible for the very important educational work which the Institute has undertaken.

A new committee, to be known as the Technical Committee, will take over the work of the Test Bar Committee, and will also be responsible for initiating investigations, tests, researches, etc., into various technical problems. This work will be done through sub-committees of specialists, who will be appointed from time to time, and who will report to the main Technical Committee. The personnel of this new committee will be elected in June.

It is confidently expected that this extension and re-arrangement of the work of the committees will enable the Institute to undertake valuable investigations into various technical matters appertaining to foundry practice,

similar to the work done by the Test Bar Committee, and that such work will be of the utmost value to the members and to the industry as a whole.

The Consultation and Finance Committees will be constituted as before.

Relations with Overseas Foundry Associations.

The close relations with overseas foundry technical associations have been maintained and cemented during the past year through the International Conference and by representation on the International Committee of Foundry Technical Associations, upon which the Institute is represented by the President and Mr. V. C. Faulkner, and of which your General Secretary acts as hon. secretary.

Exchange Papers were presented on behalf of the Institute by Mr. T. H. Turner at the French Foundry Congress in October, 1929, and by Mr. J. G. Pearce at the conference of the American Foundrymen's Association in May, 1930. Mr. H. C. Dews has consented to prepare and present a Paper, on behalf of the Institute, to the next French Foundry Congress to be held in October, 1930, and Dr. A. L. Norbury and Mr. J. Deschamps are presenting Papers, on behalf of the Institute, to the Pan-European Congress to be held at Liége in June, 1930.

The Institute has been invited to take part in the Pan-European Congress at Liége, and arrangements will be made for a party of members and their ladies to visit this Congress. It is hoped that a large number of members and ladies will be able to participate.

Relations with Kindred Associations.

The Institute continues to maintain close relations with similar Associations representing other branches of the industry. Many of the Branches hold joint meetings each session with the respective local sections of kindred Associations.

British Cast Iron Research Association.

The British Cast Iron Research Association has had a record year in general activity, in income and expenditure. The Association has been placed on a sounder basis, largely through the sympathy and encouragement of the Advisory Committee of the Department of Scientific and Industrial Research.

The Association has issued a series of recommended methods for the sampling and analysis of pig-, grey, malleable and chilled irons, together with methods for the sampling and proximate analysis of blacking and plumbago. Dr. A. L. Norbury and Mr. E. Morgan have obtained some remarkable results on cast irons which have not hitherto been supposed to possess heat-resisting properties. These irons are now being used by several members.

Experiments have been carried out on a new cupola designed by Mr. J. E. Fletcher. Work has been continued on the strength of cast iron in relation to size, and on the effect of melting conditions on the properties of alloy cast irons containing small and large amounts of manganese, chromium, nickel, molybdenum, vanadium.

A series of representative moulding sands have been examined, and comprehensive reports issued on their properties.

Mr. H. B. Field continues to represent the Institute on the Council of the Association, and the Association has recently elected the President of the Institute an ex-officio member of the Council. The General Council wishes to express its appreciation of the thought underlying this very generous action on the part of the British Cast Iron Research Association.

Branch Activities.

Papers have been given before the various Branches and Junior Sections, and a large number of works visits have been arranged. These are additional to the Papers and works visits arranged in connection with the International Conference. The General Council again wishes to express its sincere thanks to the authors of Papers and to the managements of the various works which have been visited.

General Council.

Four General Council meetings and a number of sub-committee meetings have been held at London, Newcastle and Birmingham. Sub-committee meetings have also been held at York. At the General Council meetings there has been an average attendance of 37.

The General Council consists of: (*a*) Past-Presidents of the Institute, (*b*) members elected by the Branches, (*c*) Branch-Presidents and secretaries, (*d*) ten members elected at the Annual Conference for two years (five are elected each year).

The following five members elected at the Annual Conference in 1928 retire at the annual meeting on June 17, 1930: Messrs. A. R. Bartlett, A. Campion, J. R. Hyde, H. Pemberton and J. Shaw.

All the retiring members, with the exception of Mr. John Shaw, offer themselves for re-election.

Honorary Treasurer.

It is with regret that the Council have to announce that Mr. F. W. Finch has decided not to offer himself for re-election as honorary treasurer, and they desire to take this opportunity of putting on record their very great appreciation of Mr. Finch's services to the Institute.

He convened the initial meeting which resulted in the formation of the British Foundrymen's Association, as the Institute was then called, and for some years he was honorary secretary and carried out a very large amount of spade-work, the results of which are seen to-day in the Institute's flourishing condition. In 1907 he was elected honorary treasurer, and has held that position until the present date.

Middlesbrough Conference.

The 27th annual conference will be held at Middlesbrough from June 17 to June 20, 1930, when Mr. F. P. Wilson, President-elect, will be installed President of the Institute.

Wesley Lambert, *President.*

Tom Makemson, *General Secretary.*

BALANCE SHEET, DECEMBER 31, 1929.

Liabilities.

	£ s. d.	£ s. d.
Subscriptions paid in advance		134 8 0
Sundry Creditors		449 1 5
The Oliver Stubbs Medal Fund :—		
Balance from last Account	202 5 0	
Interest to date	8 4 4	
	210 9 4	
Less Cost of Medal ..	8 10 0	
		201 19 4
The Buchanan Medal Fund :—		
Balance from last Account	97 16 3	
,, Donations £100	2 3 9	
Interest to date	6 15 2	
		106 15 2
Turner Testimonial Fund :—		
Balance from last Account	14 3 4	
Less Cost of Medal ..	10 10 0	
	3 13 4	
Balance transferred to General Fund	3 13 4	
Surplus at December 31, 1928	1,251 2 3	
Add : Excess of Income over Expenditure for the year ended December 31, 1929	98 17 0	
		1,349 19 3
		£2,242 3 2

Assets.

	£ s. d.	£ s. d.
Cash in hands of Secretaries :—		
Lancashire	45 19 0	
Birmingham	58 13 1	
Scottish	13 3 7	
Sheffield	165 3 8	
London	190 15 4	
East Midlands	26 5 4	
West Riding of Yorkshire	20 8 4	
Wales and Monmouth ..	14 18 2	
Middlesbrough	4 18 8	
		540 5 2
Cash in hands of General Secretary		6 15 11
Lloyds Bank Ltd. :—		
General Account ..	472 7 2	
Deposit Account ..	100 0 0	
		572 7 2
The Oliver Stubbs Medal Fund :—		
£342 5s. 7d. Local Loan £3 per cent. Stock at cost	200 0 0	
Balance in Lloyds Bank Ltd.	1 19 4	
		201 19 4
The Buchanan Medal Fund :—		
£125—£3 10s. Conversion Stock at 78¼	98 6 9	
Balance in hand, Midland Bank Ltd.	8 8 5	
		106 15 2
Investments Account :—		
£450 5 per cent. War Loan at Cost	430 9 10	
£300 5 per cent. Conversion Stock 1944-64 at Cost	297 14 11	
		728 4 9
Furniture, Fittings and Fixtures :—		
Per last Account ..	95 6 4	
Less : Depreciation 10 per cent. ..	9 10 8	
		85 15 8
		£2,242 3 2

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED DECEMBER 31, 1929.

Expenditure.

	£ s. d.	£ s. d.
Postage		81 12 3
Printing and Stationery, including printing of "Proceedings"		667 1 3
Council, Finance and Annual Meeting Expenses ..		69 9 2
Medals for Past-Presidents		2 6 6
Branch Expenses :—		
Lancashire	94 9 1	
Birmingham	71 2 0	
Scottish	72 4 7	
Sheffield	67 4 1	
London	47 3 1	
East Midlands	31 1 10	
Newcastle	99 3 7	
West Riding of Yorkshire	30 10 10	
Wales and Monmouth	12 12 8	
Middlesbrough	27 9 9	
		553 1 6
Audit Fee and Accountancy Charges ..		12 12 0
Incidental Expenses		116 3 1
Salaries—Secretary and Clerk		521 3 11
Rent and Rates of Office, less Received ..		79 6 4
Income Tax		7 12 0
Joint Surtees Memorial Examinations Grants to Branches		8 13 6
Depreciation of Furniture		9 10 8
		2,128 12 2
Excess Income over Expenditure		98 17 0
		£2,227 9 2

Income.

Subscriptions Received	2,171 5 10
Sale of Proceedings, etc.	1 17 0
Interest on War Loan and Cash on Deposit	45 3 6
John Surtees Medal Fund, Surplus ..	5 9 6
Turner Testimonial Fund, Surplus ..	3 13 4
	£2,227 9 2

We have prepared and audited the above Balance Sheet with the Books and Vouchers of the Institute, and certify same to be in accordance therewith.

Chartered Accountants, J. & A. W. Sully & Co., *Auditors.*

19 & 21, Queen Victoria Street, London, E.C.4.
April 1, 1930.

The Council's annual report for the year 1929-30 was unanimously adopted.

Finance.

The RETIRING-PRESIDENT, proposing the adoption of the balance-sheet and accounts for the past year, said they had been approved by the General Council. The resolution for the adoption of the balance-sheet and statement of accounts was seconded by MR. W. B. LAKE, and carried unanimously.

Alteration of Byelaws.

MR. F. J. COOK proposed that the alterations to the byelaws affecting subscribing firms, as recommended by the Council, be adopted.

MR. V. C. FAULKNER seconded.

MR. FRED. P. WILSON, J.P. (President-Elect) suggested a slight modification of the proposed byelaws, with a view to preventing their being misread. The proposed byelaws contained the sentence, "Only one such representative shall be nominated by one subscribing firm in one financial year." He was not a lawyer, but he could quite imagine that a lawyer might say that there could be only one such representative in the whole Institute. He suggested, therefore, that the sentence be altered to read, "Only one such representative shall be nominated by *each* subscribing firm in one financial year." The amendment was accepted and the resolution for the alteration of the byelaws was carried unanimously.

Election of Officers, 1930-31.

PRESIDENT.

The RETIRING-PRESIDENT proposed that Mr. Fred. P. Wilson, J.P., who had been Senior Vice-President of the Institute during the past year, be elected President for the ensuing year. He emphasised that the recommendation by the General Council that Mr. Wilson be elected was unanimous, and he felt sure that by appointing Mr. Wilson to the Presidential chair the members would be appointing a gentleman who would uphold the traditions of the Institute. Amongst his many activities Mr. Wilson had had a good deal to do with the Lads' Brigade; he could be sure that he would have no finer set of lads to deal with than those of the Institute of British Foundrymen. Mr. Lambert was not sure that they required military discipline, but his own experience of them had been very happy, and he assured Mr. Wilson that he also would have a very happy year of office.

MR. A. HARLEY (Junior Vice-President), seconding the proposal, also paid a tribute to Mr. Wilson. The Institute, he added, had already had experience of Mr. Wilson's ability, and one could be sure that under his guidance the Institute would make substantial progress.

Mr. Wilson was unanimously elected and was invested by Mr. Lambert with the Presidential Chain of Office and inducted into the chair, amid great applause.

MR. WILSON, in expressing appreciation of the honour that had been done him by his election to the Presidency, said he could not pretend, of course, that it had come as a great surprise, for it had been hanging over him for two years; the real surprise he had experienced two years ago, when the members had thought fit to elect him Junior Vice-President. Until that time he had never expected to receive such an honour. When he was first elected Junior Vice-President he had felt that he was entirely unfitted to hold such a post as the President of the Institute in the future, knowing as he did who his predecessors were, and realising particularly that he had to follow so distinguished a President as Mr. Lambert. This Institute was doing a great work in travelling around the country, year by year, and bringing the weight of its influence to bear upon the foundrymen in the different parts of the country. The Middlesbrough Branch was young, and its members had not thought that they would have the honour of entertaining the Institute until many years hence, but they felt very sure that the presence of so many members of the Institute in Middlesbrough would do, as it had already commenced to do, a very great deal to strengthen the Branch. As one who had lived in Middlesbrough throughout the whole of his life, he had had the privilege of seeing Middlesbrough grow, and he was now privileged to see the growth of the Middlesbrough Branch of the Institute of British Foundrymen.

He hoped that he would be able to help the Institute to progress during his year of office; in doing so, he would rely very much on Mr. Lambert for guidance and advice and upon Mr. Makemson, the General Secretary, for his invaluable help.

Vote of Thanks to Retiring President.

The PRESIDENT, proposing a vote of thanks to Mr. Wesley Lambert for his services to the Institute as its President during the past year, said the Institute had been honoured by having so distinguished a man at its head. It had been felt by all at the International Convention held in London in 1929 that the Institute could not have been represented better than it had been by Mr. Lambert, and those members particularly who had served throughout the year on the Council and on the various Committees, appreciated the great attention and thought he had given at all times to everything concerning the welfare of the Institute. It was impossible for one to put into words all that one felt, but he would know that members of the Institute as a whole were sincere in offering their thanks to him.

MR. JOHN CAMERON, J.P. (Past-President) was delighted to have the agreeable task of seconding the vote of thanks. In expressing his gratification also in being the first to address Mr. Wilson as President of the Institute, he recalled the formation of the Middlesbrough Branch, and said that one of the most pleasant duties he had performed during his own year of office was to come to Middlesbrough with Mr. R. O. Patterson (his predecessor) to start the Branch. On that occasion he and Mr. Patterson had had a great reception, and it was a matter for congratulation that the Branch had done so well and within four years of its formation had been able to put forward a President such as Mr. Wilson. He remembered that on the occasion of his visit to Middlesbrough four years ago he had said that perhaps the greatest pleasure and benefit that one derived from the membership of an Institute such as this, and of one of its branches, was the facility it gave for making friends, and he had often wondered how many of his good friends he would not have met at all but for his membership of the Institute. One of the best of those friends was Mr. Lambert, and it was a great pleasure to second a vote of thanks to him. Mr. Lambert had occupied office during a very exceptional year, during which he had had heavy responsibilities to carry and very onerous duties to perform, and he performed those duties well. He had conducted the Institute's proceedings with dignity, equanimity and good temper such as had not been excelled by any of his predecessors. He had done this work extremely well, and the Institute was in a very vigorous and healthy state.

The vote of thanks was carried with acclamation.

Presentation of Past-President's Medal.

The PRESIDENT, in handing to Mr. Lambert his Past-President's Medal—a decoration which is presented to all Past-Presidents at the conclusion of their periods of office—said the members could not express their thanks to him adequately in words, but asked him to believe that they felt very deeply on this matter. They hoped that Mr. Lambert would be spared for many years to come amongst them, wearing the Past-President's decoration.

MR. LAMBERT, responding, said that one or two things of an outstanding character which had occurred during his year of office had made him very proud. The first was the pre-Convention tour of Great Britain by delegates from overseas last year, and he took the opportunity again to thank the various branches of the Institute for all they had done to make that tour a success. Then there was the International Convention, the success of which was due in large measure to the attendance of so many members of the Institute; but for the splendid rally of the members on that occasion the whole thing would have been a fiasco. He was also very proud that during his year of office the work in connection with the education of the young foundry workers and the establishment of craft certificates of a national character in connection with the foundry industry had made so much progress. Another matter which was a source of satisfaction to him was that in his year of office there had been established a technical committee, and he was quite sure that the usefulness of the Institute would be increased to a very great extent as the result of the appointment of that committee. Finally, he said he had enjoyed thoroughly his work during the year.

Election of Senior Vice-President.

The PRESIDENT, proposing the election of Mr. A. Harley as Senior Vice-President for the ensuing year, said the Institute had had the advantage of his wisdom and ability on the Council for years past, and during the past year as Junior Vice-President, and the members would be very happy to have his services as Senior Vice-President during the coming year.

MR. JOHN SHAW, seconding, referred to Mr. Harley as a man of sound technical education and great ability, and said that the Institute could not do better than to elect him as Senior Vice-President.

The resolution was carried unanimously.

MR. HARLEY, expressing his thanks for the honour accorded him and for the generous remarks of the President and Mr. Shaw, said he would continue to carry out his duties as far as he possibly could to the satisfaction both of the members generally and of himself.

Election of Junior Vice-President.

MR. P. L. GOULD proposed that Mr. V. Stobie be elected Junior Vice-President, and expressed the conviction that Mr. Stobie would fill that office, and in due course that of President, most worthily.

MR. V. C. FAULKNER, seconding, said he did so with very real pleasure, because for five years Mr. Stobie had given him his daily work, and if the resolution were carried he would at least have some hand in giving Mr. Stobie some work to do, and that would help to compensate matters somewhat. Mr. Stobie, he continued, had been a member of the Institute since about 1912, and by reason of his work in connection with the development of electric furnaces he was known and appreciated internationally. He had presided with great distinction over the Newcastle-upon-Tyne Branch of the Institute, and was held in the highest esteem by the members of that important Branch.

The resolution was carried unanimously.

MR. STOBIE expressed his appreciation of the unanimous vote on his behalf, and added that the Newcastle Branch would regard as a compliment the fact that he was elected at a Convention in Middlesbrough, because the Newcastle Branch looked upon the Middlesbrough Branch as its rib, for it was really born out of the Newcastle Branch.

Election of Honorary Treasurer.

The PRESIDENT announced that the Institute's old friend Mr. F. W. Finch, who had been honorary treasurer since the Institute was formed, had expressed a wish to retire from that position. The Council had taken the opportunity to write Mr. Finch a letter of gratitude for the work he had done for so many years on the Institute's behalf, and felt sure that

the members generally would endorse that action. (Hear, hear.) The Council had recommended that Mr. W. B. Lake (Past-President of the London Branch) be elected honorary treasurer.

MR. WESLEY LAMBERT, as a member of the London Branch, proposed with very great pleasure indeed the election of Mr. Lake to the office of honorary treasurer, at any rate for the forthcoming year, and expressed the hope that he would be re-elected to that office for many years in the future.

MR. J. W. GARDOM (Past-President of the London Branch), seconding, said that when he had succeeded Mr. Lake as Branch President he had found all its affairs in good order; that was a good augury for Mr. Lake's success as honorary treasurer.

MR. H. WINTERTON, on behalf of the Scottish Branch, supported the proposal. He also expressed the regret of the whole meeting that increasing age and infirmity had forced their old friend Mr. Finch to resign, and their conviction that Mr. Lake would prove a worthy successor.

The resolution was carried unanimously.

MR. LAKE expressed his thanks for his election, and assured the members that he would do his best to carry out his duties efficiently.

Re-Election of Trustees.

On the proposition of MR. A. CAMPION, seconded by MR. T. W. MARKLAND, the following were re-elected Trustees:—

Mr. F. J. Cook, Mr. R. O. Patterson and Mr. Oliver Stubbs.

Re-Election of Auditors.

On the motion of MR. V. C. FAULKNER, seconded by MR. N. D. RIDSDALE, Messrs. J. & A. W. Sully & Company were re-elected Auditors to the Institute.

Diploma Awards.

The GENERAL SECRETARY (Mr. Tom Makemson) announced that the Council had awarded Diplomas, for Papers read during last session, to the following members:—

Mr. C. H. Kain (London Branch), for Paper on "Steel Castings."

Mr. D. K. Barclay (Middlesbrough Branch), for Paper on "Electric Steel Foundry Practice."

Mr. S. Southcott (Wales and Monmouth Branch, for Paper on "Some Aspects of Jobbing Moulding."

Mr. T. Service (Scottish Branch), for Paper on "Steel Foundry Practice."

The PRESIDENT congratulated those to whom the Diplomas had been awarded, and added that the Council did not make the awards lightly but only after most careful consideration.

Awards of Buchanan Medals.

The GENERAL SECRETARY announced that the examiners of the essays submitted for the Buchanan Medal competition had awarded two Medals, the recipients of which were Mr. E. Sutcliffe (Lancashire Junior Section) and Mr. Hubball (Birmingham Junior Section). The essays submitted by the candidates had covered the work of their respective Junior Sections throughout last session.

Greetings.

It was announced that greetings and best wishes for the success of the Convention had been received from the following: American Foundrymen's Association; Dr. Werner (President, German Foundry Owners' Association); Dr. Geilenkirchen (Director, German Foundry Owners' Association); Señor J. M. Espana (representing Spanish foundrymen); Mr. E. Ronceray (Vice-President, French Foundrymen's Association); Mr. J. Léonard (President, Belgian Foundrymen's Association); Mr. J. King (President, National Light Castings Association); Mr. J. T. Goodwin (past-President of the Institute); Mr. Oliver Stubbs (past-President of the Institute); Mr. F. W. Finch (late Hon. Treasurer of the Institute); Prof. Thomas Turner (past-President, Institute of Metals); Mr. W. G. Hollingsworth (late Secretary of the Institute); Mr. R. W. Stubbs and Mr. E. Stevenson.

PRESIDENTIAL ADDRESS.

The PRESIDENT then delivered his Address.

My first word must be in the nature of an attempt to express, only too feebly I know, the appreciation we feel in the Middlesbrough Branch in the honour you are doing us in allowing us to entertain you here for the 27th Convention. My second word is one of gratitude, mingled with some apprehension, to you for the kindness (I know it was meant kindly) you have shown in putting me into this chair. I hope you may not have cause to remove the knots that you have just put in your ties, as you come to repent to-day's "good deed."

In preparing a Presidential Address, the first temptation is to fly to the files of past "Proceedings" to see what other Presidents have said, and thus to avoid repetition. If you do this, you at once decide that everything that could be said has already been said, and, moreover, said better than you can hope to do it. If, therefore, you decide to leave past-Presidents and all their works severely alone, the probability is that much that you will say will be but a poor imitation of what has been expressed before. In spite of this danger I decided to avoid the files and to try to say, very simply, such things as appear to me to fit the occasion and to have, possibly, some useful bearing on the work and aims of the I.B.F. You will pardon me if some of my remarks about the Institute are household words to you as members, but one feels that this is one among the few opportunities that we get for a little publicity. The visitors and the Press, whose presence we welcome amongst us, may have but little knowledge of our activities and ideals, and we may venture to hope that through them we may reach a public which might otherwise look on us as little more than a large picnic party.

The Past.

Will you forgive me if I take you back 24 years to the August of 1906, when the British Foundrymen's Association, as it then was, held its third Convention here and met in the adjacent High School? I believe the printed Proceedings are now a rare and valuable book, and I am indebted to the British Cast Iron Research Association, through Mr. J. G. Pearce, the director, for the loan of their copy. The President was then the late Mr. Herbert Pilkington, and the Vice-President, our old friend Mr. F. J. Cook; whilst of the Council of twelve, Mr. J. Ellis appears to be the only survivor. Mr. F. W. Finch was secretary and treasurer, a position from which he has only just resigned. The meeting was reported as being "largely attended," though the number present was only about 46. Mr. J. T. Goodwin, who had not then left this health resort, was prominent among those making the local arrangements. The Association was then but two years old, and its membership was 169. The income for the year was about £45 and the expenditure about £12. There were three Branches—Manchester, Birmingham and Cardiff. Four Papers were read, and it is interesting to note that even in these prehistoric times such subjects as "Shrinkage" and "Grading by Fracture" were keenly discussed.

The works of Bolckow Vaughan, Cargo Fleet and Richardsons Westgarth were visited and a banquet was held, at which I note Mr. Gimson gave two recitations and Mr. H. Winterton sang songs, of which the number is not recorded.

I have referred to this Convention for its historical interest, and also because, in the words of the prophet Isaiah, we do well to "look unto the rock whence ye are hewn and to the hole of the pit whence ye are digged." Whatever the hole may stand for, we may certainly take the rock to represent those men of faith and courage who launched our Association 27 years ago.

The Present.

From the past I come to the present. You have heard the Annual Report, which shows that our membership is now about 1,800, a gain of only about 20 in the year and, say, 200 in the last eight years. I find that in that period we have added about 1,300 members and lost 1,100, suggesting that either the life of the foundryman is short or that he makes his fortune rapidly and retires at an early age.

At any rate, it is clear that the expansion of the membership is not rapid, but we must remember that the period named has been one of twilight, if not darkness, in industry, and there is no doubt that unemployment, total or partial, is responsible for many finding it more than difficult to maintain their membership.

It is, I think, true to say that among scientific and technical institutions we are unique, in that our membership includes every type of worker connected with the industry. It follows, therefore, that where no small proportion of our members is earning a weekly wage, there must, in bad times, be cases of hardship.

Our branches have been considerate, perhaps sometimes too considerate, in these cases, and though the strict reading of the rule in regard to compulsory retirement is tempered with mercy—and rightly so—it is necessary that it should be enforced where interest has flagged and subscriptions have got into arrear. There has been a tightening-up this year in this respect, and it is reflected in the membership figures.

As regards finance, Mr. Makemson has kindly supplied me with some figures which show that in 11 years our annual income has increased from about £500 to £2,200, and expenses from £500 to, say, £2,100, whilst over this period the excess of income over expenditure has been in all about £860. This is all to the good, but it does show that economy in branch working is important, and one might perhaps emphasise that it benefits the I.B.F. but little if branches which, through exceptionally good management or unusually fortunate circumstances, succeed in amassing a handsome balance, retain it in their own coffers. Some branches have a struggle for existence, financially, and one would like to feel that the more wealthy ones took a delight in handing over some of their surplus to headquarters, so that the weaker brethren might be helped over a bad patch.

The Future.

So much for the past and the present. May I now take you with me as we look a little way into the future? First, as regards Papers for discussion.

The full programmes of the branches show what a wide range of subjects is covered every session in the some 100 Papers that are read in the year, and our hearts must sometimes overflow in sympathy with the Branch-Secretary who has to make up his programme. The question is sometimes asked whether we make the fullest use of all these Papers. It is true that they appear, most of them in THE FOUNDRY TRADE JOURNAL, but I believe we might make more use of some of them by getting the authors to come down to our branches and re-present the Papers that have already been put before the Convention or some other branch.

I am sure the authors would be willing, if circumstances permitted, to help in this way. Fresh points of view might arise in fresh discussions, and our branches would have the opportunity of meeting their fellow enthusiasts from elsewhere. Not long ago a few representative members were discussing, informally, the question of Papers, and the feeling was strong that we must be on our guard against their becoming too highly technical.

We owe a great deal to our metallurgists and chemists, and when, as fortunately is often the case, they can talk to us in a way that a moulder

can understand, we value them still more, but we cannot live by metallurgy alone, and we should do all we can to encourage the moulder and the patternmaker to get up and tell us about their lives' little worries. Members will perhaps agree with me that some of the best meetings we have known have been those informal ones when a moulder has been induced to get up and tell us how he made a waster and why it was not his fault!

One hears complaints that some of the older and larger societies are leading their ordinary members quite out of their depth, with the attendant risk of losing both the members and their subscriptions. We pride ourselves, and with some justice, on our cosmopolitan membership. It might, to use a modern phrase, be classed as a vertical section of the foundry industry, and the last thing we want to develop is a series of horizontal sections.

At the same time we must not forget that we are not all moulders, and it is very important that the commercial side as well as the so-called practical and technical sides shall not be overlooked. We have occasionally had valuable Papers on works costing, and, in these difficult days, the importance of this aspect cannot be exaggerated. There are still among us a few of those Heaven-born geniuses who can look at a casting or pattern and say without hesitation what it will cost to make. We can only stand and marvel at their wisdom, though, when it comes to competing with them, we have to stand sorrowfully aside. Many of us have tried to evolve what we have hoped and believed to be sound methods of costing, but we have much to learn from America and the Continent in regard to standard methods.

Foundry Certificates.

During the year your Council has spent much time in exploring this problem. The foundry, so long despised and rejected of men, is coming to be recognised as an essential and highly important department of an engineering or manufacturing concern. The descriptions and illustrations of new foundries in the JOURNAL are sufficient evidence of a change of heart amongst our manufacturers. It is inevitable that with these developments there will arise a demand for properly-trained managers and foremen.

Incidentally, at this point I should like to take the opportunity of congratulating Dr. Ingall, the Principal of this College, on having, in his own and its first year, instituted an evening foundry course, with an Advisory Committee of local foundry managers, the course including periodical visits to works. He is now preparing for a full-day, two years' course, and to this end has set up an Advisory Committee, to which the Institute has been asked to send two representatives.

A natural outcome of this special training here and elsewhere is that we must envisage the institution of a National Certificate which the students of this and other colleges may take and which will be recognised by employers as representing some definite standard of attainment. Until such a National Certificate is in being, the local certificates should have some value amongst employers who will take the trouble to examine the curricula.

Now may we look a little further and consider the status of the Institute itself? It is well known that some of the technical societies that began in a small way, much as we did, found in course of time that it would be to the material advantage of their members if they could show by the fact of their membership that they had certain qualifications. This led to the institution of examinations as a qualification for membership and the right to use appropriate letters after their names.

Lest any of us should tremble at the thought of an examination at our advanced age, I may say that I believe the practice has been for existing members to have all the rights during their lifetime, so that in the course of, say, a generation, all members would be recognised as being qualified by examination.

None of us would wish to seek an empty glory by the use of titles that had not been earned, and we should lower the standing of our Institute, as well as our own, if we made membership too cheap. Incidentally, some of you may have been annoyed, as I have often been, by an advertiser who adds to your name various letters which imply no qualification beyond the fact that you have paid your subscription (or should have done) to some technical society or other.

There are, of course, great difficulties about devising an examination in foundry practice where there are so many varieties of knowledge and practice involved and where no man could be expected to be proficient in all of them, but nevertheless the time may have arrived when as an Institute we might rightly consider whether such initials as M.Inst.B.F. might not be made to stand for something, so that an employer, when seeking to make an appointment in his foundry staff, might insist on applicants having this qualification. The status of the Institute would be enhanced thereby, and we should not only strengthen our membership but save some of the recent leakage.

Membership to most of us has been an individual matter of seeking to improve our efficiency and increase our knowledge, and one does not want to spoil the pursuit of knowledge, for its own sake, by introducing a mercenary motive, but the fact remains that it is both legitimate and necessary to use knowledge and efficiency for the purpose of obtaining a livelihood, and if the prestige of the Institute should be such that its members came to be rather sought after there would be nothing discreditable in it.

On the question of membership of the Institute, Mr. J. G. Pearce, of the British Cast Iron Research Association, has given me some particulars of the foundry industry, and he estimates that in the United Kingdom there are some 5,000 foundries, including malleable and non-ferrous, and that these employ about a quarter of a million hands. Of this number he estimates that about one half are skilled.

Taking our membership as 1,800, we have 0.36 of a member in each foundry. That fractional man is doubtless an excellent fellow, as far as his limitations allow, but can he be said to represent his foundry? In point of fact we do not represent the trade as we should.

As far as our numbers go, we can claim, with all modesty, that foundry science, practice and research are all represented to an extent that is rather remarkable in so comparatively small an institution. It behoves us, therefore, to use whatever influence we have as individuals and as an Institute to increase our numbers amongst both firms and foundry workers.

I must refer to another development that is now before your Council, namely, the setting up of special committees to investigate various foundry problems as they arise from time to time. It may not be known generally to what an extent our American friends have taken this kind of work in hand. The American Foundrymen's Association has something like a score of committees dealing with a great variety of questions.

It is not proposed that we should attempt to emulate their example to anything like that extent, but we do feel that such work as our own Test Bar Committee, for example, has done so thoroughly, should be extended, and that there should, if necessary, be power in the hands of the Council to set up appropriate committees, which could, if desired, co-opt specialists, for the exploration of matters of immediate importance. The proposal, as approved by the Council, is that a Technical Committee be formed with the object of initiating investigations, tests and researches and, when necessary, delegating the inquiries to sub-committees.

This is a very important step, and it shows that your Council is not asleep. It will entail more work upon your representatives, and few societies ask for and receive more voluntary work from their honorary officials than does the Institute. At the same time, I venture to think that no society gets more willing and inexpensive service. It need hardly be emphasised that there is no suggestion of taking over the work and responsibilities of the B.C.I.R.A., though no doubt that valuable body will be asked to co-operate in many ways. Our connection with them is so close and so vital that I feel I ought to refer to them here.

The last issued Report is really quite fascinating reading. The work that they are doing and the advice that is available to their subscribers is remarkable, and it is unfortunate that ordinary and trade members together should only number some 233. Mr. Pearce estimates that the annual value of iron castings produced in the United Kingdom, without finishing costs, may be put at £40,000,000. As there are about 2,500 ordinary iron foundries, one can only hope that when trade improves and foundry owners come to realise better that only by pooling knowledge with others they can hope to succeed, more of them will take advantage of membership in this invaluable Institution.

I remember that last year Mr. Lambert referred to the welfare schemes now in operation in many of our works. I do not think we can overestimate the value that such schemes, when properly handled, have had and are having in developing the *esprit de corps* of the works and helping to bridge the gulf that was so rapidly widening between employer and employed as a result of the passing away of the old family business on its absorption into the large limited company.

Rationalisation, that blessed word, that must come into every speech nowadays, is making units larger and removing the superman at the top further than ever from the labourer at the bottom, and welfare work will become more than ever valuable. Such schemes cost money, and there is a danger that in these times the absence of profits may tend to curtail their scope, but a great deal of voluntary work will always be done willingly by the employees, whose appreciation of what is offered them increases in the ratio of the trust that is placed in them to manage the details. Some of you, through the kindness of the Imperial Chemical Industries, Limited, will have an opportunity of seeing a most complete scheme of social welfare at the Synthetic Ammonia works at Billingham.

There are, of course, ten thousand employees there to be catered for, and of necessity things must be on a big scale, so they include not only sports grounds and club rooms but an infant welfare centre and a very complete modern theatre. Is it stretching the point too far, to suggest that in its own way our Institute can claim to be a welfare agency, by bringing together all ranks of the foundry industry in the happy comradeship of a common interest?

From the welfare of workers I pass, in a word, to the welfare of nations.

Our cordial association with the foundry industry of the Continent and America was strikingly illustrated in the International Convention last year, and it was well said by Mr. Harley that the interchange of Papers and visits from time to time are a factor of no small value in cementing the nations together in the bonds of mutual friendship and respect. We have many friends across the Channel, and it is unthinkable that, while discussing with them a foundry problem, we could at the same time be casting munitions of war in our shops.

I said at the beginning that I could not hope to say anything very new, but there are always some visitors at a Convention who have never been there before, and it is to them mainly that I have spoken. We cannot afford to have an "inferiority complex" in the Institute. We belong to no mean society, and its usefulness depends as much on the individual member as on the Council or the President. If we want to encourage the production of the best Papers and

to see progress in our status as an Institute we must make attendance at branch meetings a matter of conscience and payment of our subscriptions a matter of principle. Above all, let us cultivate a proper pride in an Institute which, built up in a once-neglected industry, has become unique in its standing and value.

Vote of Thanks to the President.

Mr. A. Harley (Senior Vice-President), proposing a vote of thanks to the President for his Address, said he believed Mr. Wilson would prove to be a "surprise packet." He had been very modest, but in his Address he had attained a very high standard, and it was to be hoped that the Address would be published practically verbatim. The members appreciated not only his words of wisdom on many aspects of the Institute's work but also his canny humour—for a sense of humour was a very valuable attribute in a President. The members generally would derive much benefit from the reading of the Address.

Mr. John Shaw, seconding, said that the Address contained references to many matters which were vital to the trade, upon which the members could ponder profitably. It was particularly interesting to note the President's remarks concerning membership, and to appreciate the importance which he attached to that problem.

Mr. Wesley Lambert, supporting the vote of thanks, also paid a tribute to the President for his Address, which was by no means shallow, but which contained a very great deal which provided food for thought for all who were concerned for the future of the Institute.

The vote of thanks was carried with acclamation.

Dr. Ingall and his Staff Thanked.

Mr. Wesley Lambert asked the meeting for authority to express, on their behalf, thanks to Dr. Ingall (Principal of the Constantine Technical College) and his staff and students for the demonstrations they had given on the previous evening, on the occasion of the reception at the College, of the various plants in the laboratories. The demonstrations, he added, had involved a considerable amount of work by the staff and students, who had also given up their leisure on that particular evening.

The members expressed their thanks, and asked Mr. Lambert to convey them to Dr. Ingall and his staff and students.

The late Lady Bell.

The President, on behalf of the meeting, expressed the deepest sympathy with Sir Hugh Bell on the recent loss of his wife—Lady Bell. The names of Sir Hugh and Lady Bell, said the President, were well known, particularly in the Middlesbrough district, where they had been outstanding figures in commerce and in social service, and in every way that made for the public good. The people in the district had felt that by Lady Bell's death they had suffered a personal loss. Another reason for mentioning this at such a gathering, said the President, was the fact that Sir Hugh was intimately connected with the Institute's programme during the Convention week. As Vice-Chairman of Messrs. Dorman, Long & Company, Limited, he had been partly responsible for the invitation extended to the members to luncheon and to visit that company's works, and as Chairman of the River Tees Conservancy Commissioners he would be the host on the occasion of the river trip to Teesmouth on the second day of the Convention. Further, Sir Hugh had been good enough to write a short article for publication in the Convention Handbook, which article had dealt with the history of Middlesbrough. Again, only a few weeks before her death, Lady Bell had lent the Winter Garden for the purposes of the "Save the Countryside" Exhibition, which was visited by the ladies attending Middlesbrough for the Convention. Lady Bell was, indeed, an exceptional character; in art, music and literature she had excelled, and on the human side of life she had possessed very great qualities. For many years she had been in and out of the homes of the workers, helping them in many ways, and Middlesbrough had suffered a great loss by her death.

On the suggestion of the President, the members stood in silence for a short period as a mark of appreciation of the late Lady Bell and of sympathy for Sir Hugh Bell.

Members Elected to Council.

It was announced by the President that the following had been elected to the Council as the result of the ballot:—Messrs. A. Campion, Hurren, Hyde, W. Jolley and A. R. Bartlett.

A Welcome to Overseas Visitors.

On behalf of the members, the President extended a hearty welcome to Mr. W. Main (an ironfounder, of Melbourne, Australia) and Mr. Emmett (of Buenos Aires), who were attending the Convention.

The reading of Papers was then commenced.

Mr. Victor Stobie, M.I.E.E.

Junior Vice-President of the Institute of British Foundrymen.

Mr. Victor Stobie is a native of Birmingham. He was educated there and at St. Maur's School, Paris. He recalls with interest that on his return to England his English was less fluent than his French. After studying electrical engineering in the Electrical Engineering Department of University College, Sheffield, he entered the Metallurgical Department of the same College, where he was under the tutorship of Profs. Arnold and McWilliam. During his last year of studentship his college and some others were formed into the University of Sheffield.

In 1905 Mr. Stobie patented a method of annealing uniformly, and without scaling, long bars of high-carbon steel in producer gas-fired furnaces. It had not been possible in existing types of producer gas-fired furnaces to control completely the heat-treatment of the finer steels. So satisfactorily did the new method overcome previous difficulties, that similar furnaces were built by Mr. Stobie, throughout Europe and the U.S.A., for all types of high-quality steels in long bars. The Sheffield Annealing Works were established by Mr. Stobie about the same time, and most of the Sheffield steelworks had their fine steels heat-treated there.

In 1909 the Stobie Steel Company, since Limited, was founded, and a small open-hearth furnace was installed. In 1910 Mr. Stobie was commissioned by Electro Metals, Limited, to design an electric furnace for them, in which were incorporated some Swedish patents. That furnace was placed the same year alongside the open-hearth furnace in his works, and was the first commercial British-designed electric arc furnace. In 1912 Mr. Stobie disposed of his Sheffield interests and established electric steelworks on the Tyne at Dunston. The first plant included a 5-ton Stobie electric furnace, which was the first arc electric furnace completely originated and designed in Great Britain. Later a 12-ton Stobie furnace was added, and, in succession, a 15-tonner and then a 20-tonner. The last two furnaces were of the stationary type, as distinct from the usual tilting type.

A number of electric furnaces constructed by Mr. Stobie are installed in other steelworks in Great Britain and abroad; the largest in Great Britain being of his make. Recently he has designed and put down at Dunston a high-frequency induction steel-melting furnace of 7½-cwt. capacity.

Mr. Stobie was instrumental in shattering the notion, held for generations by workers in high-carbon quality steels, that ingots of such steels required coal-fired furnaces, pouring out clouds of smoke, for their correct heating prior to forging or rolling. During one of the greatest exigencies of the war a considerable demand arose for plain carbon high-quality steel of 1.10 per cent. to 1.15 per cent. carbon. Many thousands of tons were produced by Stobie Steelworks, and, as existing forging facilities would not permit a sufficiently quick billetting down of the ingots, it was decided to have the material rolled in a large cogging-mill at another works. The one available had only producer gas-fired furnaces for heating ingots. The Brymbo Steelworks, the works in question, were commissioned to undertake the work, and, after their furnace hands and mill men had been instructed by Mr. Stobie and his staff in what special points were to be given attention in the heat-treatment of the steel, the work proceeded smoothly and every ingot of the many hundreds of tons so treated was completely satisfactory.

Two further items of some interest in connection with Mr. Stobie's electric steel-melting furnace work may be mentioned. In the course of a Paper on "Large Electric Furnaces" given in 1919 before a joint meeting of the Iron and Steel Institute and the Institution of Electrical Engineers, he described experiments he conducted with small-scale model electric furnaces, constructed to represent every known type of arc electric furnace and using mercury to represent the molten steel, which proved that electromagnetic circulation of the molten charge did not occur in electric arc furnaces, as had previously been the general belief.

During the discussion of the Paper, Mr. T. M. Service, the chief metallurgist of Messrs. Wm. Beardmore & Company, Limited, and, incidentally, a member of the I.B.F., related as a matter of metallurgical interest how he and the Government Torpedo Factory had examined macroscopically and microscopically some electric steel which had been made for them at the Stobie Steelworks in which they failed to detect by the most searching tests the slightest trace of slag inclusion. Until then it had been accepted as an axiom by metallurgists that no steel could be produced by a commercial melting process without its exhibiting slag inclusions.

Mr. Stobie has given Papers on various technical subjects before the Iron and Steel Institute, the Institution of Electrical Engineers, the West of Scotland Iron and Steel Institute, the Cleveland Institute of Engineers, the Institute of British Foundrymen and the Sheffield Society of Engineers and Metallurgists, of which institutions, with one exception, he is, or has been, a member. His membership of the Institute of British Foundrymen dates back to 1912. He was President of the Newcastle Branch during 1927-28.

Catalogues Received.

Motors.—Higgs' Motors, of Witton, Birmingham, have sent us their Stock List for June. It contains 16 pages and carries matter of direct use to the potential purchaser, that is the matter is technical, and beyond the incorporation of a few slogans is devoid of "boost."

Wire Brushes.—Messrs. Wire Brushes, Limited, of Roberttown, Liversedge, Yorks, have sent us an 8-page catalogue which details and illustrates about 30 different types of wire brushes and sundries, the majority of which find some application in the foundry. It is interesting to note that their lines are made throughout of British material, and the exact number of wires per knot is standardised, whilst the solid backs are also a feature. This extremely utilitarian catalogue is available to our readers on request.

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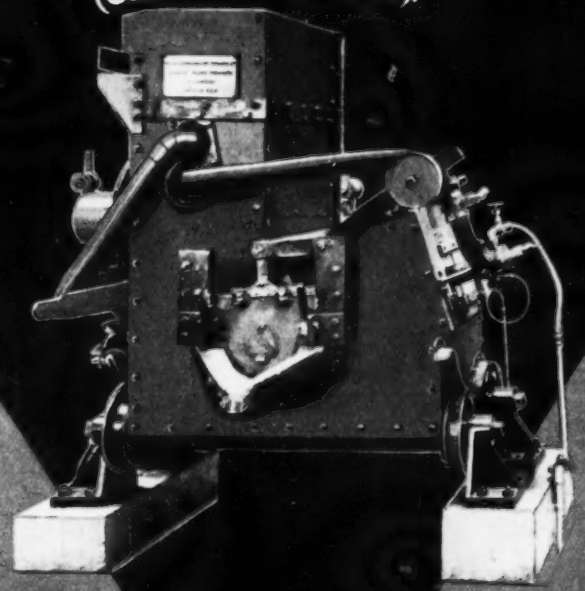

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A New Sand-Dressing Machine.

Essential progress has lately been made in the domain of the economic preparation of moulding sand, and especially through the different designs of small portable sand-dressing machines which have been on the market for some years. High efficiency, security, small power consumption, and reduction of wear were obtained more or less perfectly. The new construction, detailed below, combines all these advantages.

Moulding sand, which in the main consists of quartz, clay, coal dust and water, acquires by adequate dressing excellent properties, so far as plasticity, refractoriness and firmness are concerned. The dressed sand must have a permeability to air, so that the gases developing during the casting can easily escape. For obtaining good castings, it is essential that the sand particles are thoroughly mixed and rubbed. All impurities, and especially bits of iron, must be separated during the dressing process. Consequently, the dressing of the sand comprises, besides the moistening of the sand, the following operations:—(1) Screening; (2) separation from iron; (3) mixing; (4) rubbing, and (5) aerating.

These operations generally require sieving machines, magnetic separators, mills, and centrifugal machines, which all together are combined in one unit. Such plants are stationary, require much space, high first cost, and are expensive in operation. Small portable machines, simple in construction, suggested themselves so long as they ensured a thorough working of the moulding sand. In order to meet this demand, small sand-dressing machines have been developed. These are small centrifugal machines, which eject the sand to the side, the working parts of which consist of rotating fly or paddle wheels, bladed drums or belts fitted with teeth. The moulding sand can thus be worked at the moulding stations, and the machine is available where wanted. Consequently, economy in capital outlay and working costs are obtained, especially attributable to the reduction in sand-handling cost.

Whilst there are advantages, various defects became apparent in these machines. In one case it consisted of an unavoidable incrustation of sand inside the casing, which caused rapid wear of the blades and the casing, involving increased power to operate the machine owing to the unnecessary friction.

Another type throws the sand by means of an endless belt fitted with teeth, requires less power. A grating fitted at the discharge retains any deleterious matter. The necessary fineness of the sand thrown or combed by this machine is not quite realised in this particular design. Moreover, the mixing and rubbing of the sand particles is not effected, as the belt machines have no working members for these operations.

The idea thus presented itself, to build a sand-dressing machine, simple in construction and easily portable, which in one single operation with sieve, separate the iron, mix, rub and aerate the moulding sand, and which in spite of the perfect working reduces the consumption of power and the wear to a minimum. This ideal, it is claimed, has been achieved through the introduction of the "V.S.K." type, illustrated by Figs. 1 and 2, built by Messrs. Vogel & Schemman A.-G., Hagen-Kabel (Germany), whose sole British agents are Messrs. Macnab & Company, 150, Holborn, London, E.C.1. This machine screens, mixes, rubs, aerates and cleanses the moulding sand in one operation, and requires less than 0.2 h.p. for each cubic meter, or 1½ tons per hour. It is built in sizes from 7 to 18 tons per hour.

The power consumption includes all frictional and other resistances of the machine. The machine consists substantially of an oscillating sieve, with outlet for discharging refuse material; a mixing drum fitted with blades across the periphery, thereby forming revolving pockets; a mixing chamber; a driving gear with electric motor, and a wheeled framework. After passing through the sieve, the sand drops down on the rising side of the drum into the pockets formed by the impeller blades in the drum, and there gripped in small quantities by the blades and forced underneath a hinged flap valve, which by its weight presses the sand against the revolving drum. As only small quantities of sand can be seized at one time by the blades, a thorough working and mixing of the sand is ensured. The sand is triple-mixed, firstly by the sieving and additionally by the whirling in the mixing chamber, and by the rubbing action under the flap valve. The flap valve lifts automatically if the working pressure is too high or any obstacle such as a piece of metal intervenes. This machine is immune from damage from iron falling into the chamber, the flap valve precluding any breakage. Bits of iron, etc., which are not separated by the sieve, are caught by the iron grating arranged at the delivery mouth, and fall to ground, as shown in Fig. 2.

This arrangement of the working parts, especially the hinged flap valve over the mixing drum, allows the elimination of a tightly-fitting casing around the drum. The drum thus rotates freely in a large chamber, and no incrustations of sand can occur. The whole efficiency of the motor is applied to the dressing of the sand, apart from a very small fraction of power which is required to overcome the friction of the ball bearings. The quality of the prepared sand is of such a kind that each grain of silica is surrounded with a fine covering of clay and carbon dust. The actual operation of the "V.S.K." machine is stated to be highly satisfactory, and it can be depended upon to give long service, free from trouble and breakages.

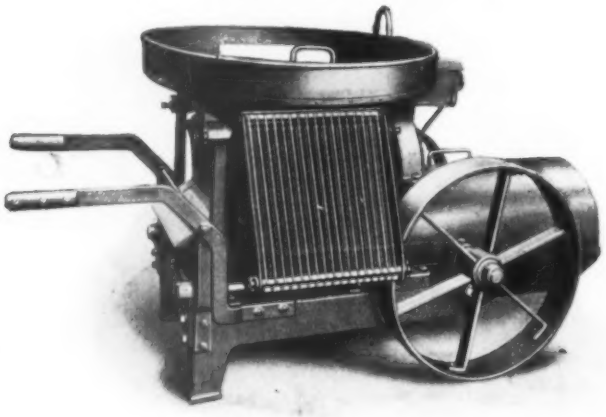

Fig. 1.—General Appearance of the V.S.K. Sand-Dressing Machine.

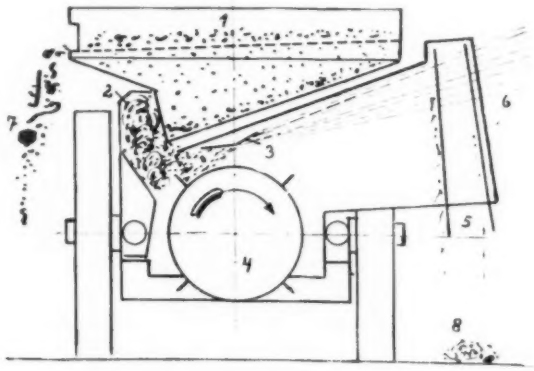

Fig. 2.—Sectional View of a V.S.K. Machine.

1. Reciprocating Sieve. 2. Mixing Chamber. 3. Throttle flap valve. 4. Mixing Drum. 5. Screen. 6. Sand Discharge. 7. Refuse. 8. Iron.

Continental Steel Cartels.

It is anticipated that the present rate of restriction imposed on the production of steel ingots, which was agreed to by the national groups in the Continental Steel Cartel towards the end of last year, will be continued for some time ahead. In the meantime the actual output in the different countries is said to amount only to about 40 per cent. of the quotas.

Last week the Committee for semi-finished steel met at Liége to consider further the setting up of a selling bureau or selling syndicates for semi-products in place of the order-distribution offices now in existence. These offices are reported to have come to an agreement with the Swiss merchants on lines similar to those entered into with a group of British merchants, while a similar arrangement is proposed with the merchants in Holland.

Tubes and Rails.

Negotiations are to take place between the Continental Tube Syndicate and the Swedish tube makers with a view to the admission of the latter to the Syndicate. A provisional agreement in regard to prices in the Swedish market is reported to have been made a short time ago, and the forthcoming discussions will aim at confirming the agreement. At the same time, efforts are apparently being made to get the Nippon Steel Tube Company to enter into an agreement with the Continental Tube Syndicate in respect to the Japanese market. On the other hand, it is reported that the company itself is endeavouring to get included in the Syndicate. The Japanese production of steel tubes amounts to about 70,000 tons per annum, while the imports come to about 20,000 tons.

Rail Making in Japan.

It is reported from Tokyo that a new rail mill is to be erected to turn out about 300,000 tons per annum to meet the inland demand. As the Japanese already compete with the International Rail Makers' Association (the Irma), the carrying out of the scheme in question would imply an accentuation of competition from that source.

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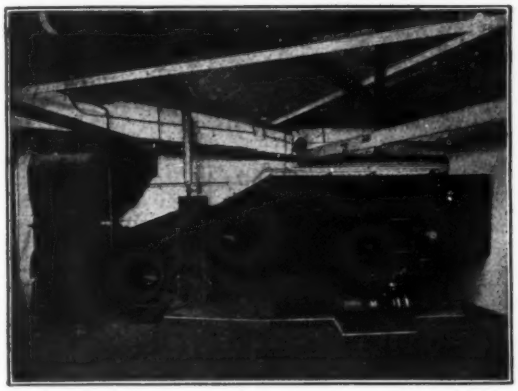

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Trade Talk.

The output of steel castings in France for the month of April is stated to have been 21,000 tons.

Messrs. Edgar Allen & Company (Canada), Limited, have acquired new and more commodious premises at 116, McGill Street, Montreal.

The Standing Committee appointed by the Board of Trade is to hold an inquiry, on July 15, as to whether imported steel shafts for golf clubs should be required to bear an indication of origin.

Messrs. Henry Robb, Limited, Leith, have received from South America an order for a steel twin-screw motorship of 1,500 tons. The vessel will be fitted with Diesel engines to be installed by the builders.

Members of the Glasgow and West of Scotland Association of Foremen Engineers and Draughtsmen paid a works visit recently to Fraserburgh as guests of the Consolidated Pneumatic Tool Company, Limited.

The Coleman Foundry Equipment Company, Limited, foundry engineers and equipment manufacturers, have removed from 1, Lancaster Place, Waterloo Bridge, London, W.C.2, to 14, Southampton Street, Strand, London, W.C.2.

At a meeting at Essen on June 18 of the leaders of the German Metal Workers' Union, it was announced that the administration of the union had decided unanimously to oppose any reduction in wages. The union has also decided to grant full financial assistance to all members who oppose wage reduction.

The Whitehead Iron & Steel Company, Limited, state that work is actively proceeding in connection with the construction of the new 12-in. semi-continuous bar and strip mill at Newport. The buildings and foundations are half completed. The contracts for the whole of the main machinery were placed with British firms.

The first section of the carrillon, which has been manufactured by Messrs. Gillett & Johnston, the Croydon bell-founders, to the order of Mr. Rockfeller, for the Rockfeller Baptist Church in New York, was shipped at the Royal Albert Docks last Friday in the American merchant liner "American Trader." The Bourdon, the largest of the bells, weighs nearly 20 tons.

Messrs. William Beardmore & Company, Limited, Dalmuir, have received a contract for the manufacture and installation of exhaust steam turbines on the Bauer Wach system in seven Clan Line vessels. Although the work will not require an increased number of employees, it will probably enable the firm to retain for several months all those at present employed.

An announcement in the "Feuille Officielle Suisse du Commerce" states that, for a period of three months from June 1, iron waste and scrap iron may be exported from Switzerland without payment of export duty, except in the case of barrel hoops more than 3 mm. thick, wheel rims for ordinary carriages and horse-shoes, which will remain subject to the export duty (of 1.20 fcs. per 100 kilogs.).

Messrs. Edgar Allen & Company, Limited, have purchased the patterns, drawings, etc., for the rotary screens and tar-macadam mixers manufactured by Messrs. Ord & Maddison, Limited, Victoria Works, Darlington. They have also bought designs, etc., for the same firm's rolls and stone-breakers. In future Edgar Allen & Company, Limited, will be prepared to manufacture complete machines or spare parts to these designs.

Messrs. F. W. Bridges & Sons, Limited, have transferred their offices from Southampton Row to Grand Buildings, Trafalgar Square, W.C.2. Their new telephone number is Regent 6861-2. Messrs. Bridges are the organisers of the International Foundry Trades Exhibition and the Laundry and Allied Trades Exhibition, which are held at the Royal Agricultural Hall, and of the Shipping, Engineering & Machinery Exhibition, and the Printing and Allied Trades Exhibition, both of which are held at Olympia.

The English Electric Company, Limited, have received a contract from the Central Electricity Board for 16 transformer units, totalling 130,000 k.v.a., for the Mid-East England scheme. The contract comprises six 10,000-k.v.a., 66-k.v. transformers, two each for Kirkstall, Harrogate and York; two 10,000-k.v.a., 22-k.v. transformers, for Huddersfield; four 7,500-k.v.a., 33-k.v. units, two each for Peterborough and Barnsley; and four 5,000-k.v.a., 33-k.v. transformers, two each for Rotherham and Doncaster. Each unit will be complete with on-load tap-changing gear.

A cablegram from Johannesburg states that Mr. F. N. Pickett, chairman of the Manganese Corporation, when interviewed, expressed satisfaction with the progress of the development of the property towards the export stage during the past 18 months. The railway, for which the Corporation advanced £200,000, is nearly complete. Some 80,000 tons of ore are awaiting transport for shipment. The ore has been sold at satisfactory prices for forward contract. Subsequent export will be 1,000 tons a day, and the ultimate possibilities are 1,000,000 tons a year. Mr. Pickett says there is a big demand for lower-grade ore.

Messrs. Greenwood & Batley, Limited, Leeds, are well known as manufacturers of the De Laval steam turbine, which is essentially a high-speed machine of the pure impulse type, the steam being expanded in specially-designed nozzles to the final exhaust pressure before passing the single row of blades on the turbine wheel. There are, however, in modern industry, many cases where conditions can be better met by the use of an impulse turbine of the multi-stage type of equal reliability. For the past three years Messrs. Greenwood & Batley, Limited, have been occupied with the design and construction of machines of this latter type, and are now in a position to supply such machines in cases for which the De Laval type is not particularly suitable.

The Electricity Commission has issued a return of engineering and financial statistics relating to electricity supply in Great Britain. The return refers to the calendar year 1928 in the case of company undertakers, and the year 1928-29 in the case of public authority undertakers. It is stated that the production of the public supply in 1928-29 involved the operation of 485 generating stations, containing in aggregate 5,801,770 kw. of generating plant. With regard to the different classes of supply, power supplies accounted for about 63 per cent., lighting and domestic supplies for 26 per cent., and traction supplies for about 9 per cent. of the total units sold to consumers. The sales of electrical energy for power purposes increased by 389,000,000 units. The statistics indicate that economies continued to be effected in the utilisation of fuel at steam-driven generating stations during the year under review. Public supply undertakings were consumers of coal and coke to the extent of over 8,200,000 tons in 1928-29, and the average cost of such fuel amounted to 15s. 7d. per ton, compared with 17s. 10d. in 1927-28.

Contracts Open.

Johannesburg, August 11.—Thirteen jib cranes, for the South African Railways and Harbours Administration. The Department of Overseas Trade. (Reference A.X. 9,683.)

Johannesburg, August 11.—80-ton fixed electric crane, for the South African Railways and Harbours Administration. The Department of Overseas Trade. (Reference A.X. 9,727.)

Johannesburg, July 14.—Pig-iron, ferro-manganese and ferro-silicon, for the South African Railways and Harbours Administration. The Department of Overseas Trade. (Reference A.X. 9,681.)

Plymouth, July 8.—1,000 yds. of 9-in., 2,000 yds. of 6-in. and 4,000 yds. of 4-in. cast-iron pipes, for the Corporation. Mr. F. Howarth, water engineer, Stonehouse Town Hall, Plymouth.

New Companies.

Vauxhall Aluminium Company, Limited, 31, Cannon Street, Birmingham.—Capital £10,000. Director and secretary: A. J. Wilson.

Brytcast Stainless Metals, Limited, Nimmings Road, and Green Lane, Blackheath, Birmingham.—Capital £45,000. Directors: C. Grahame-White (chairman), W. E. Martin, E. F. C. Roberts, and J. S. Critchley.

Obituary.

Mr. J. Young, chief costing clerk of the Carron Company, Falkirk, died at the age of 60 years on June 14. He had been in the service of the company for 45 years.

Personal.

Mr. Robert Liddle has retired after 31 years' service with Messrs. Carmuirs Iron Company, Limited, Falkirk. He is the last of the employees who joined the firm on its inauguration, and has received a presentation from the staff and employees.

Messrs. N. Nicholson, A. Badger, K. H. Gloag, H. Brearley and Lieut.-Colonel A. C. Thomson have accepted invitations to join the board of directors of Messrs. J. J. Habershon & Sons, Limited, steel rollers and founders. Mr. Nicholson's position will be that of ordinary director and the others will be departmental directors. The new directors have been closely identified with the administrative side of the business.

Mr. Robert Booth, who has represented the Whitehead Iron & Steel Company, Limited, for the past 22 years in London, has decided to retire. Mr. Booth is 74 years of age. His services have contributed very materially to the expansion of the company's business. At the request of his colleagues on the board, Mr. Booth will continue as a director and act in a consulting capacity both in regard to technical and commercial matters. After June 30 the representation of the Whitehead Iron & Steel Company, Limited, in London will be in the hands of Mr. William Brown, a director of the company, who has for many years successfully acted in this capacity in the Midlands. Under this change the selling arrangements will be entirely reorganised and the London and Midland areas amalgamated under Mr. Brown, which will give a wider and more effective control. Mr. J. F. Fox-Davies, who has for many years ably assisted Mr. Booth, will continue to act in the same capacity under the new arrangement.

Mr. D. E. Grant, who has for the past six years been at Elswick Works, Newcastle-upon-Tyne, in charge of the Close Works Iron Foundry, steel foundry and latterly of the drop stamping and forging business (now part of the English Steel Corporation) has been appointed managing director of Messrs. Dixon & Corbitt and R. S. Newall & Company, Limited, of Gateshead-on-Tyne, the well-known hemp and wire-rope manufacturers. Mr. Grant has had a varied career. During the war he held the rank of captain in the York and Lancaster Regiment, and served in Egypt and France, when he was wounded. He was then appointed Director of Forgings and Stampings in the Ministry of Munitions, and on demobilisation joined Sir W. G. Armstrong, Whitworth & Company, as assistant general commercial manager. In 1920 he went to the States on this firm's behalf to take over their business activities, and during his stay there organised in Montreal the firm of Charles Walmsley & Company, Limited, makers of paper machinery, etc. Prior to the war he was with various firms in England, and spent two years in the Far East erecting rubber factories. Mr. Grant commences his new duties on July 1.

Wills.

Bowley, Malcolm, senior partner of Messrs. Malcolm Bowley & Son, Cullum Street, London, E.C., metal brokers	£24,714

Reports and Dividends.

Butterley Company, Limited.—Final dividend of 4 per cent., making 5 per cent., tax free.

Marshall, Sons & Company, Limited.—Net profit, £2,355; brought in, £17,164; written off debenture issue expenses, £1,500; carried forward, £18,019.

Horseley Bridge & Engineering Company, Limited.—Profit, £4,157; brought in, £8,647; carried forward, £12,805. The directors regret that the trading results do not justify payment of a dividend.

Guest, Keen & Nettlefolds, Limited.—Net profit, after providing for debenture interest, etc., £968,698; brought in, £243,885; preference dividends, £317,107; final dividend on the ordinary shares of 5 per cent., making 10 per cent., tax free; carried forward, £264,999.

Stanton Ironworks Company, Limited.—Profit, £240,531; brought in, £117,187; available, £353,356; debenture interest, £35,812; preference dividends, £21,152; final dividend of 6 per cent., tax free, on the ordinary shares, making 10 per cent., tax free; reserve for depreciation, £50,000; carried forward, £132,720.

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Iron and Steel Markets.

Pig-Iron.

MIDDLESBROUGH.—Even the presence of a considerable body of potential buyers in connection with the annual gathering of the Institute of British Foundrymen at Tees-side has failed to impart increased animation to this week's Cleveland iron market, and, as a matter of fact, the general tone throughout has, if possible, been more than usually listless in an actual business sense. The only feasible explanation of such conditions as are thus briefly outlined seems to be that consumers are still holding off in anticipation of more favourable price terms, being fully aware that supplies are always readily available at short notice, so that no risks are run in delaying purchases until the last possible moment. Ironmasters are equally ready to affirm that in spite of the recent fall in the cost of raw materials, present pig-iron prices yield no margin of profit, but that has not weakened the belief that pig-iron will be cheaper before trade expands. Shipments are also on a declining scale as well as home demands, the latest returns reflecting a heavy deficiency in the tonnage, as compared with the totals for May. The present outlook for the industry is thus very far from encouraging, and few members of the trade are optimistic enough to expect any improvement in the position until autumn buying brings increased activity to markets. The fixed prices maintained by the Ironmasters' Association are:—No. 1 Cleveland foundry iron, 70s. per ton; No. 3 G.M.B., 67s. 6d.; No. 4 foundry, 66s. 6d.; No. 4 forge, 66s. per ton.

Prices in the market for East Coast hematite continue a steadily weakening tendency, without to any extent improving the demand, both home and export sections of the industry being adversely affected by keen competition on the part of Continental producers. Makers' stocks are also on the heavy side, with quotations consequently irregular, 71s. 6d. per ton being indicated for small lots, but every sale is a matter of bargaining, and it is fairly certain that 70s. per ton would be gladly accepted for a 1,000-ton order. On the North-West Coast Bessemer mixed numbers are quoted nominally at 72s. 6d. per ton at works.

LANCASHIRE.—In common with most districts consuming foundry iron, the demand in the local markets has now diminished to summer season proportions, buying being limited to immediate needs in much restricted volume. Prices also remain stationary, with Derbyshire and Staffordshire No. 3 quality quoted at 77s. and Scottish brands at 94s. to 95s., all per ton delivered local stations.

THE MIDLANDS.—At Birmingham this week business in the foundry pig section was quiet as usual, and few transactions of importance were reported, mostly for small prompt orders to meet current requirements. Prices are unchanged at 75s. for Northants No. 3 and 78s. 6d. for Derbyshire and North Staffordshire No. 3, with Scotch makes quoted 93s. 6d. to 94s. 6d., all per ton delivered local stations.

SCOTLAND.—Very reluctantly, the Scottish pig-iron makers have at last intimated a reduction in their prices. A reduction of 1s. 6d. per ton has come into force, the new prices being 76s. 6d. for No. 3 Scotch foundry, f.o.t. furnaces, with a minimum extra of 2s. 6d. per ton for No. 1. Mixed numbers of Scotch hematite are quoted at 79s. 6d. and basic at 75s., both f.o.t. steelworks.

Finished Iron.

In the Black Country, business in this class of material continues quiet, with prices about as previously quoted. Marked bars are firm at £12 10s. at works, and it is only in iron of this quality that any satisfactory business is passing. The makers are fairly well occupied, although not so busy just now as they were some weeks back. It is in connection with crown and the cheaper grades of iron that the real depressing effects are observed. The mills are quite unable to secure sufficient business to keep going with any degree of regularity, and there is much competition between the makers in this area and those in other districts for available business. Crown bars are quoted at £10 to £10 7s. 6d., and nut and bolt iron at £9 to £9 5s. Little support is possible in connection with the latter from local consumers, as they are forced by price considerations to go to the Continent for their supplies of bars.

Steel.

In common with the general conditions now prevailing in all branches of industry, at home and abroad, the market for steel, finished and semi-finished, is experiencing an exceedingly difficult time, without much prospect of immediate recovery. At Sheffield there is only meagre buying of acid and basic billets, while business in wire rods is also restricted. The latest reduction of 2½d. per lb. in the price of tungsten has brought no improvement in the demand. There is no change in market quotations, which are:—Siemens acid billets, £9 10s.; basic billets, soft, £6 10s.; medium, £7 12s. 6d. to £8 2s. 6d.; hard, £9 2s. 6d. to £9 12s. 6d.; acid wire rods, £12 5s. to £12 10s.; basic wire rods, soft, £8; medium hard, £9 15s. to £10; hard, £10 10s. to £11; steel hoops, £9 10s. to £10 5s.

In the tinplate market, current quotations still rule at 18s. to 18s. 1½d. for coke quality, net cash, f.o.b. South Wales ports.

Scrap.

Demand for all descriptions of foundry scrap material is again on a greatly diminished scale, and in some markets it is difficult to find buyers, even at much reduced prices. At Middlesbrough this week ordinary heavy cast iron is a shade easier at 57s. 6d., and good machinery quality in handy sizes at 60s. per ton. In Scotland, heavy machinery quality is quoted at around 64s. to 65s., ordinary cast iron at about 5s. less, old railway chairs around 63s. 6d., light metal 48s., with firebars at 47s. The above prices are all per ton delivered f.o.t. consumers' works.

Metals.

Copper.—Price movements in markets for base metals during the past week were almost universally on the down-grade, with warrant copper values reacting to further low records, though rallying somewhat towards the close. The position had been adversely affected by the marking down of the New York price of electrolytic to 12 cents per pound, and further by the American financial crisis and the disappointing statistics showing an increase instead of a decrease as anticipated in the May return of American stocks in hand.

Closing quotations :—

Cash.—Thursday, £50 5s. to £50 7s. 6d.; Friday, £49 15s. to £49 17s. 6d.; Monday, £48 7s. 6d. to £48 10s.; Tuesday, £48 17s. 6d. to £49; Wednesday, £48 10s. to £48 12s. 6d.

Three Months. — Thursday, £50 10s. to £50 12s. 6d.; Friday, £49 15s. to £49 17s. 6d.; Monday, £48 7s. 6d. to £48 10s.; Tuesday, £48 17s. 6d. to £49; Wednesday, £48 10s. to £48 12s. 6d.

Tin.—Recent developments in the position of standard tin have almost consistently tended in the direction of lower values, due to the continual slackness of demand and the apparent failure of the restriction measures, although there was a sharp rise towards last week's closing market. Apart from the further measures of restriction contemplated by the Tin Producers' Association, there are no other factors to suggest the probability of an early recovery from the present depression.

Official closing prices :—

Cash.—Thursday, £138 5s. to £138 10s.; Friday, £138 15s. to £139; Monday, £134 2s. 6d. to £134 5s.; Tuesday, £136 12s. 6d. to £136 15s.; Wednesday, £139 10s. to £139 15s.

Three Months.—Thursday, £140 to £140 5s.; Friday, £140 10s. to £140 15s.; Monday, £136 2s. 6d. to £136 5s.; Tuesday, £138 10s. to £138 15s.; Wednesday, £141 10s. to £141 15s.

Spelter.—Prices of spelter have gradually declined owing to further liquidation, and a little "bear" selling. There is no improvement in the demand from consumers.

Daily fluctuations :—

Ordinary.—Thursday, £16 12s. 6d.; Friday, £16 11s. 3d.; Monday, £16 5s.; Tuesday, £16 5s.; Wednesday, £16 2s. 6d.

Lead.—Until recently one of the steadiest of non-ferrous metals, the market for lead has given way to a certain extent in recent weeks. This is hardly surprising when the all-round weakness of the non-ferrous metal market is considered.

The week's prices have been :—

Soft Foreign (Prompt).—Thursday, £17 17s. 6d.; Friday, £17 17s. 6d.; Monday, £18; Tuesday, £18; Wednesday, £17 18s. 9d.

Senior Vice-President of the I.B.F.

Mr. A. Harley, the recently-elected Senior Vice-President of the Institute of British Foundrymen, is a native of Falkirk, and was educated at the Falkirk High School and at the Glasgow Technical College. His training as metallurgical chemist he received in the laboratories of the Carron Company, under his uncle, Mr. Boston Harley. For a period of about two years, Mr. Harley was associated with the Alloa Coal Company, being in charge of the surface plant at the new collieries which, at the time, were being developed near Bannockburn.

He was engaged with the Coalbrookdale Company, of Shropshire, for nine years, as an assistant to the late Mr. Duncan Sinclair, the general manager.

Subsequently, Mr. Harley was appointed by the Daimler Company of Coventry to supervise the erection of their new foundry. He has managed this for the past twenty years, and about eight years ago was also put in charge of the company's general laboratories and heat-treating department.

Mr. Harley joined the Institute of British Foundrymen in 1910, and is a past Branch-President. His portrait is included in the report, on page 472 of this issue, of the 27th Annual Convention of the Institute.

Patent Specifications Accepted.

The following list of Patent Specifications accepted has been taken from the "Illustrated Official Journal (Patents)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each. The last numbers given are those under which the Specifications will be printed and abridged, and all subsequent proceedings will be taken.

4,326. Detrick Company, M. H. Furnace walls. 328,651.

4,336. Duffield, F. L. Recovery of nickel and other metals from ores containing nickel. 328,696.

16,156. Kurze, W. Process and apparatus for filling moulds with sand or the like. 312,369.

23,409. Possenti, A., and Scorza, C. Centrifugal casting of hollow metal bodies. 328,882.

25,972. I. G. Farbenindustrie Akt.-Ges. Method of manufacturing shaped sections of uniform thickness from sheet-metal strips. 328,890.

3,430. Nobilleau, G., and Guipet, J. Protection of iron, copper, and their alloys. 308,778.

11,275. Ries, P., and Bicheroux, F. Processes and apparatus for dephosphorising iron. 310,468.

18,885. Eutenеuer, J., Abrams, A., and Hoffmann, F. Conveying devices, particularly for rolling-mills. 313,930.

19,008. Haddan, R. (Crane Packing Company). Tools or devices for pulling tubes from tube sheets. 329,203.

16,548. Verein für Chemische und Metallurgische Produktion. Pickling of iron and steel. 312,996.

17,362. Kuttner, E. W. Electrolytically producing insulating layers on articles of aluminium and its alloys. 329,190.

24,201. Berry, H. H., and Markham, W. J. Corrugating thin sheet metal. 329,234.

20,721. Ashcroft, E. A., and Elmore, F. E. Reduction of tin and other metals. 329,159.

33,108. Vereinigte Stahlwerke Akt.-Ges. Process for increasing the elongation limit and tensile strength of low-carbon steels. 300,553.

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WEEKLY PRICE CURRENT.

COPPER.

	£	s.	d.
Standard cash	48	10	0
Three months	48	10	0
Electrolytic	54	10	0
Tough	53	15	0
Best selected	54	5	0
Sheets	83	0	0
India	67	0	0
Wire bars	56	10	0
Do. July	56	10	0
Do. August	56	10	0
Ingot bars	56	10	0
H.C. wire rods	58	0	0
Off. av. cash, May	53	5	0 15/16
Do., 3 mths., May	53	1	5 1/16
Do., Sttlmnt., May	53	4	2 1/16
Do., Electro, May	60	9	6 8/16
Do., B.S., May	59	10	3 3/4
Do., wire bars, May	61	8	2 1/16
Solid drawn tubes			12d.
Brazed tubes			12d.
Wire			8 1/4d.

BRASS.

Solid drawn tubes	10 3/4d.
Brazed tubes	12 1/4d.
Rods, drawn	10 1/2d.
Rods, extd. or rlld.	6 1/4d.
Sheets to 10 w.g.	9 1/2d.
Wire	9 1/2d.
Rolled metal	8 3/4d.
Yellow metal rods	6 1/4d.
Do. 4 × 4 Squares	7d.
Do. 4 × 3 Sheets	7 1/4d.

TIN.

	£	s.	d.
Standard cash	139	10	0
Three months	141	10	0
English	140	10	0
Bars	139	15	0
Straits	138	15	0
Australian	137	17	6
Eastern	138	2	6
Banca	141	12	6
Off. av. cash, May	144	18	0 5/11
Do., 3 mths., May	146	15	10 11/11
Do., Sttlmt., May	144	17	6

SPELTER.

	£	s.	d.
Ordinary	16	2	6
Remelted	15	5	0
Hard	13	0	0
Electro 99.9	18	10	0
English	16	12	6
India	14	15	0
Zinc dust	22	0	0
Zinc ashes	4	5	0
Off. aver., May	18	1	11 3/4
Aver., spot, May	16	12	9 9/22

LEAD.

	£	s.	d.
Soft foreign ppt.	17	18	9
English	19	10	0
Off. average, May	17	16	6 3/4
Average spot, May	17	15	10 10/11

ZINC SHEETS, &c.

	£	s.	d.
Zinc sheets, English	27	0	0
Do. V.M. ex-whf.	25	10	0
Rods	30	0	0
Boiler plates	22	0	0
Battery plates	24	0	0

ANTIMONY.

	£	s.	d.
Special brands, Eng.	38	0	0
Chinese	26	0	0
Crude	20	0	0

QUICKSILVER.

	£	s.	d.
Quicksilver	22	10	0

FERRO-ALLOYS AND STEEL-MAKING METALS.

	£	s.	d.
Ferro-silicon—			
25%	7	17	6
45/50%	11	10	0
75%	18	10	0
Ferro-vanadium—			
35/50%	12/9 lb. Va.		
Ferro-molybdenum—			
70/75% c. free	4/2 lb. Mo.		
Ferro-titanium—			
23/25% carbon-free	9d. lb.		
Ferro-phosphorus, 20/25%	£16	0	0
Ferro-tungsten—			
80/85%	2/7½ lb.		
Tungsten metal powder—			
98/99%	2/10½ lb.		
Ferro-chrome—			
2/4% car.	£30	10	0
4/6% car.	£23	10	0
6/8% car.	£22	7	6
8/10% car.	£22	0	0
Ferro-chrome—			
Max. 2% car.	£33	10	0
Max. 1% car.	£37	17	6
Max. 0.70% car.	£39	15	0
70%, carbon-free	11d. lb.		
Nickel—99% cubes, or pellets	£175	0	0
Ferro-cobalt	9/7 lb.		
Aluminium 98/99%	£95	0	0
Metallic chromium—			
96/98%	2/7 lb.		
Ferro-manganese (net)—			
76/80% loose	£11	15	0
76/80% packed	£12	15	0
76/80% export	£11	10	0
Metallic manganese—			
94/96% carbonless	1/7 lb.		

Per ton unless otherwise stated.

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Finished bars, 18% tungsten	£0 3 0

Per lb. net, d/d buyers' works.

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Rounds and squares, 3 in. and over	4d. lb.
Rounds and squares, under ½ in. to ¼ in.	3d. lb.
Do., under ¼ in. to 3/16 in.	1/- lb.
Flats, ½ in. × ¼ in. to under 1 in. × ⅛ in.	3d. lb.
Do., under ½ in. × ¼ in.	1/- lb.
Bevels of approved sizes and sections	6d. lb.

Bars cut to length, 10% extra.

SCRAP.

South Wales—	£	s.	d.		£	s.	d.
Heavy steel	2	17	0	to	2	18	0
Bundled steel and shrngs.	2	12	6	to	2	13	6
Mixed iron and steel	2	10	0	to	2	12	6
Heavy cast iron	2	15	0	to	2	16	6
Good machinery for foundries	2	17	0	to	2	18	0
Cleveland—							
Heavy steel					2	10	0
Steel turnings					2	4	0
Cast-iron borings					2	0	0
Heavy forge					3	10	0
W.I. piling scrap					3	5	0
Cast-iron scrap	2	17	6	to	3	0	0
Midlands—							
Ord. cast-iron scrap					3	5	0
Heavy wrought					3	5	0
Steel turnings					1	12	6
Scotland—							
Heavy steel					2	12	6
Ordinary cast iron					3	0	0
Engineers' turnings					2	3	6
Cast-iron borings					2	0	0
Wrought-iron piling					3	12	6
Heavy machinery					3	5	0

London—Merchants' buying prices delivered yard.

	£	s.	d.
Copper (clean)	43	0	0
Brass	32	0	0
Lead (less usual draft)	15	10	0
Tea lead	12	0	0
Zinc	9	0	0
New aluminium cuttings	60	0	0
Braziery copper	40	0	0
Gunmetal	42	0	0
Hollow pewter	100	0	0
Shaped black pewter	75	0	0

PIG-IRON.

(f.o.t. unless otherwise stated.)

N.E. Coast—	
Foundry No. 1	70/-
Foundry No. 3	67/6
Foundry No. 4	66/6
Forge No. 4	66/-
Hematite No. 1	72/-
Hematite M/Nos.	71/6
N.W. Coast—	
Hem. M/Nos. d/d Glas.	85/6
„ d/d Birm.	90/6
Midlands—	
Staffs. common*	—
„ No. 4 forge*	73/6
„ No. 3 fdry.*	78/6
Shrops. basic	—
„ Cold blast, ord.	—
„ „ roll iron	—
Northants forge*	70/-
„ fdry. No. 3*	75/-
Derbyshire forge*	73/6
„ fdry. No. 3*	78/6
„ basic*	—
Scotland—	
Foundry No. 1	79/-
„ No. 3	76/6
Hem. M/Nos.	79/6
Sheffield (d/d district)—	
Derby forge	68/6
„ fdry. No. 3	73/6
Lincs. forge	70/-
„ fdry. No. 3	75/-
E.C. hematite	86/-
W.C. hematite	88/-
Lincs. (at furnaces)—	
Forge No. 4	—
Foundry No. 3	—
Basic	—
Lancashire (d/d eq. Man.)—	
Derby forge	72/-
„ fdry. No. 3	77/-
Staffs foundry No. 3	77/-
Dalzell, No. 3 (special)	105/- to 107/6
Summerlee, No. 3	94/6
Glengarnock, No. 3	—
Gartsherrie, No. 3	94/6
Monkland, No. 3	94/6
Shotts, No. 3	94/6

*d/d Black Country dist.

FINISHED IRON AND STEEL.

Usual District deliveries for iron; delivered consumers' station for steel.

Iron—	£	s.	d.		£	s.	d.
Bars (cr.)					10	15	0
Nut and bolt iron	9	0	0	to	9	5	0
Hoops					10	15	0
Marked bars (Staffs) f.o.t.					12	10	0
Gas strip					10	15	0
Bolts and nuts, ¾ in. × 4 in.					15	5	0
Steel—							
Ship plates	8	15	0	to	8	17	6
Boiler plts.	9	15	0	to	10	10	0
Chequer plts.					10	12	6
Angles					8	7	6
Tees					9	7	6
Joists					8	10	0
Rounds and squares, 3 in. to 5½ in.					9	7	6
Rounds under 3 in. to ¾ in. (Untested)					8	0	0
					and upwards		
Flats—8 in. wide and over					8	12	6
„ under 8 in. and over 5 in.					8	17	6
Rails, heavy					8	10	0
Fishplates					12	0	0
Hoops (Staffs)	9	5	0	to	9	15	0
Black sheets, 24 g.					9	15	0
Galv.cor.shts., 24g.					11	17	6
Galv. fencing wire, 8g. plain					12	0	0
Billets, soft	6	0	0	to	6	10	0
Billets, hard	7	10	0	to	8	0	0
Sheet bars	5	15	0	to	6	5	0
Tin bars	6	2	6	to	6	5	0

PHOSPHOR BRONZE.

	Per lb. basis.
Strip	1/1½
Sheet to 10 w.g.	1/2
Wire	1/4½
Rods	1/2½
Tubes	1/6½
Castings	1/1½

Delivery 3 cwt. free.
10% phos. cop. £40 above B.S.
15% phos. cop. £50 above B.S.
Phosphor tin (5%) £30 above price of English ingots.
C. Clifford & Son, Limited.

NICKEL SILVER, &c.

	per lb.
Ingots for raising	8d. to 1/2
Rolled—	
To 9 in. wide	1/2 to 1/8
To 12 in. wide	1/2½ to 1/8¼
To 15 in. wide	1/2½ to 1/8½
To 18 in. wide	1/3 to 1/9
To 21 in. wide	1/3½ to 1/9½
To 25 in. wide	1/4 to 1/10
Ingots for spoons and forks	8d. to 1/4½
Ingots rolled to spoon size	11d. to 1/7½
Wire round—	
3/0 to 10 G.	1/8½ to 2/0½

with extras according to gauge.

AMERICAN IRON AND STEEL.

At Pittsburgh unless otherwise stated.

	Dols.
No. 2 foundry, Phila.	19.76
No. 2 foundry, Valley	18.50
No. 2 foundry, Birm.	14.00
Basic	20.26
Bessemer	20.76
Malleable	20.76
Grey forge	19.76
Ferro-mang. 80%	94.00
O.-h. rails, h'y, at mill	43.00
Billets	33.00
Sheet bars	33.00
Wire rods	36.00
	Cents.
Iron bars, Phila.	2.12
Steel bars	1.75
Tank plates	1.70
Beams, etc.	1.70
Skelp, grooved steel	1.80
Skelp, sheared steel	1.80
Steel hoops	2.20
Sheets, black, No. 24	2.55
Sheets, galv., No. 24	3.20
Sheets, blue an'l'd, No. 13	2.15
Wire nails	2.15
Plain wire	2.30
Barbed wire, galv.	2.80
Tinplates, 100-lb. box	$5.25

COKE (at ovens).

Welsh foundry	27/6
„ furnace	18/- to 22/-
Durham and Northumberland—	
„ foundry	14/6 to 15/6
„ furnace	14/- to 14/6
Midlands, foundry	—
„ furnace	—

TINPLATES.

f.o.b. Bristol Channel ports.

I.C. cokes	20×14 box	18/-
„	28×20 „	36/-
„	20×10 „	26/-
„	18¾×14 „	18/9
C.W.	20×14 „	16/6
„	28×20 „	33/6
„	20×10 „	23/6
„	18¾×14 „	17/-
Terneplates	28×20	32/6 per box basis f.o.b.

SWEDISH CHARCOAL IRON & STEEL.

Pig-iron	£6	0	0	to	£7	10	0
Bars, hammered, basis	£17	10	0	to	£18	10	0
Bars and nail-rods, rolled, basis	£15	17	6	to	£16	15	0
Blooms	£10	0	0	to	£12	0	0
Keg steel	£32	0	0	to	£33	0	0
Faggot steel	£20	0	0	to	£24	0	0
Bars and rods dead soft, steel	£11	0	0	to	£14	0	0

All per English ton, f.o.b. Gothenburg.

TUBES AND FITTINGS.

Over ½ in. up to 6 in.

	Tubes.	*Fittings.*
Gas	62½%	47½%
Water ..	58¾%	42½%
Steam ..	55%	37½%

W.I. 12½% extra.

DAILY FLUCTUATIONS.

Standard Copper (cash).

		£	s.	d.		
June	19 ..	50	5	0	inc.	67/6
,,	20 ..	49	15	0	dec.	10/-
,,	23 ..	48	7	6	,,	27/6
,,	24 ..	48	17	6	inc.	10/-
,,	25 ..	48	10	0	dec.	7/6

Electrolytic Copper.

		£	s.	d.		
June	19 ..	53	10	0	dec.	10/-
,,	20 ..	55	10	0	inc.	40/-
,,	23 ..	54	10	0	dec.	20/-
,,	24 ..	54	10	0	No change	
,,	25 ..	54	10	0	,, ,,	

Standard Tin (cash).

		£	s.	d.		
June	19 ..	138	5	0	inc.	97/6
,,	20 ..	138	15	0	,,	10/-
,,	23 ..	134	2	6	dec.	92/6
,,	24 ..	136	12	6	inc.	50/-
,,	25 ..	139	10	0	,,	57/6

Tin (English ingots).

		£	s.	d.		
June	19 ..	139	10	0	inc.	100/-
,,	20 ..	140	0	0	,,	10/-
,,	23 ..	135	5	0	dec.	95/-
,,	24 ..	137	15	0	inc.	50/-
,,	25 ..	140	10	0	,	55/-

Zinc Sheets (English).

		£	s.	d.		
June	19 ..	27	0	0	No change	
,,	20 ..	27	0	0	,,	,,
,,	23 ..	27	0	0	,,	,,
,,	24 ..	27	0	0	,,	,,
,,	25 ..	27	0	0	,,	,,

Spelter (ordinary).

		£	s.	d.		
June	19 ..	16	12	6	inc.	5/-
,,	20 ..	16	11	3	dec.	1/3
,,	23 ..	16	5	0	,,	6/3
,,	24 ..	16	5	0	No change	
,,	25 ..	16	2	6	dec.	2/6

Lead (English).

		£	s.	d.		
June	19 ..	19	5	0	No change	
,,	20 ..	19	5	0	,,	,,
,,	23 ..	19	5	0	,,	,,
,,	24 ..	19	10	0	inc.	5/-
,,	25 ..	19	10	0	No change	

AVERAGE PRICES OF GALVANISED CORRUGATED SHEETS (NORTH OF ENGLAND).

Year.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly average.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1901	13 0 0	12 5 0	11 10 0	11 16 0	11 10 0	11 10 0	11 10 0	11 10 0	12 0 0	12 0 0	12 0 0	12 0 0	11 17 1
1902	12 0 0	11 10 0	11 10 0	11 10 0	11 15 0	11 15 0	11 15 0	11 15 0	11 15 0	11 15 0	11 15 0	11 15 0	11 14 2
1903	11 5 0	11 5 0	11 5 0	11 10 0	11 10 0	11 10 0	11 10 0	11 10 0	11 5 0	11 5 0	11 5 0	11 5 0	11 7 1
1904	11 5 0	11 5 0	11 5 0	11 5 0	10 15 0	10 15 0	10 15 0	10 15 0	10 5 0	10 5 0	10 5 0	10 5 0	10 15 0
1905	10 7 6	10 7 6	10 7 6	10 7 6	10 7 6	10 7 6	10 7 6	10 7 6	11 0 0	11 5 0	11 15 0	12 0 0	10 15 0
1906	12 12 6	12 12 6	12 12 6	12 7 6	12 7 6	12 7 6	12 12 6	12 12 6	12 15 0	12 15 0	12 15 0	13 5 0	12 12 11½
1907	13 5 0	13 5 0	13 15 0	13 15 0	13 15 0	13 15 0	13 17 6	13 17 6	13 17 6	13 2 6	13 2 6	13 2 6	13 10 10
1908	13 2 6	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 11 0½
1909	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	11 0 0	11 0 0	11 0 0	11 0 0	11 0 0	11 16 8
1910	11 15 0	12 5 0	12 5 0	11 15 0	11 10 0	11 10 0	11 12 6	11 12 6	11 12 6	11 12 6	11 10 0	11 10 0	11 13 4
1911	11 5 0	11 1 3	10 15 0	10 15 0	10 13 9	10 10 0	10 13 9	11 0 0	11 5 0	11 5 0	11 5 0	11 7 0	10 19 7½
1912	11 10 0	11 10 0	11 10 0	11 15 0	12 5 0	12 5 0	12 5 0	12 5 0	12 5 0	12 12 6	12 18 0	12 15 0	12 2 11½
1913	12 15 0	12 15 0	12 15 0	12 11 3	11 18 0	11 15 0	11 15 0	11 15 0	11 15 0	11 3 0	11 0 0	11 2 6	11 18 4
1914	11 7 0	11 7 6	11 7 6	11 5 7½	11 2 6	10 15 0	10 15 0	12 17 6	14 2 0	13 7 0	11 15 7	11 2 6	11 16 0
1915	11 10 8½	13 12 6	14 8 9	15 0 6	17 17 6	20 17 6	20 17 6	20 6 3	17 12 6	18 1 0	22 13 9	25 2 0	18 3 4½
1916	26 5 0	27 12 6	28 0 0	28 5 0	29 0 0	29 0 0	28 15 0	28 3 0	28 15 0	28 15 0	28 15 0	28 15 0	28 6 8½
1917	28 15 0	28 15 0	28 15 0	28 15 0	28 15 0	28 15 0	28 15 0	28 15 0	28 15 0	28 0 0	28 0 0	28 0 0	28 11 3
1918	28 5 0	28 15 0	29 0 0	29 0 0	29 0 0	29 0 0	29 0 0	29 0 0	29 0 0	29 0 0	29 0 0	29 0 0	28 13 4
1919	29 0 0	29 0 0	29 0 0	28 0 0	28 10 0	27 7 6	27 5 0	29 3 0	32 0 0	33 0 0	36 10 0	40 8 4	31 5 3½
1920	46 10 0	49 15 0	53 15 0	56 0 0	55 10 0	54 10 0	52 10 0	48 10 0	44 3 4	39 2 6	35 17 6	30 8 0	47 4 3
1921	28 10 0	25 17 6	24 5 0	23 3 4	22 0 0	22 0 0	23 10 0	21 12 6	20 0 0	18 15 0	18 3 9	17 2 0	22 1 7
1922	16 17 6	15 13 9	16 3 0	16 10 0	16 4 4½	15 15 6	15 16 3	16 16 0	16 8 9	16 6 3	17 1 0	17 7 6	16 7 5½
1923	18 3 1½	19 1 11½	19 8 0	19 10 0	19 7 0	19 1 3	18 0 0	18 13 1½	19 0 0	19 3 9	19 2 6	18 19 4½	18 19 2
1924	18 13 6	18 9 4½	18 5 0	17 15 11½	17 3 0	17 19 4½	18 7 6	18 8 1½	18 8 1½	17 19 6	17 11 3	17 10 0	18 0 10½
1925	17 8 6	17 1 6½	16 9 4½	16 12 0	16 9 8½	16 9 4½	16 0 6	16 1 10½	16 5 0	16 7 0	16 12 6	6 15 0	16 11 0½
1926	16 14 4½	16 5 7½	16 0 6	15 11 10½	15 11 3	16 0 0	16 16 0	16 18 9	16 14 0	16 18 9	17 10 0	6 19 0	16 10 0½
1927	16 3 1	15 7 6	15 3 3	15 3 1½	14 14 4½	14 11 6	14 1 10½	14 0 0	13 19 6	13 16 10½	13 13 1½	13 3 9	14 9 10
1928	13 0 0½	13 2 6	13 6 0	13 2 6	13 3 0	13 6 9	13 11 3	13 10 0	13 10 7½	13 12 6	13 11 6	13 10 0	13 8 8½
1929	13 11 0	13 13 1½	13 12 9½	13 10 11½	13 9 3	13 8 9	13 11 6	13 7 6	13 7 6	13 5 6	12 18 9	12 12 9½	13 7 5½
1930	12 5 0	11 15 0	11 19 6	11 18 7	11 18 0	—	—	—	—	—	—	—	—

WILLIAM JACKS & COMPANY,

WINCHESTER HOUSE, OLD BROAD ST., LONDON, E.C.2.

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SMALL ADVERTISEMENTS.

Notice.

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(A remittance should accompany instructions.)

SITUATIONS VACANT AND WANTED.

YOUNG Aluminium Moulder seeks work; travel anywhere; Jobbing, Bench or Floor, also experience in Coremaking. State pay and length of job.—Box 556, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

ASSISTANT Foreman for general jobbing engineering foundry (30 miles London) doing work up to 30 cwts. Must be used to high-class and tested work. Excellent opportunity to energetic man who knows his job, together with regular employment.—State age, experience, copies of references, and wages required, to Box 548, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

FIRST-CLASS General Jobbing Moulders required. High wages and regular job to good men.—State age and experience to Box 550, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

FOUNDRY Foreman for Iron, Steel and Brass Foundry in Egypt, fully experienced in melting operations and with a sound knowledge of Foundry Work, to control native labour. Good progressive position for single man, age not more than 34, with strong will and ability. Probation period one year, later contract three years.—Apply, BEECROFT & PARTNERS, LIMITED, The Foundry Chemists, Retort Works, Sheffield.

REQUIRED for Abroad:—
(1) Works Manager;
(2) Assistants to Works Managers;
(3) Works Engineers;
(4) Foreman;
(5) Master Workman;
for Smelting Furnaces, Fireclay Muffle Furnace, Rolling-mills and affiliated trades.—Only highly qualified men with many years' practical experience in the above trades please apply, with full details, to J. Z., 22137 Rudolf Mosse, Berlin S.W. 100, Germany.

YORKSHIRE REPRESENTATIVE.—Special Pig-iron Manufacturers require Representative for Yorkshire. Liberal terms offered to suitable man, who must have active personal connections amongst foundrymen.—Applications only considered from those who send fullest particulars in strictest confidence to Box 538, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

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145,000 Sq. Ft. of SHOPPING,
Compact and Convenient.
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Will Sell whole or in lots to suit customers or Let on favourable terms. Unique opportunity for Manufacturers.

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TO Engineers, Founders, Manufacturers.—Fine site of nearly three acres on arterial road, with Foundry and Workshops and own Rail Sidings into the premises. Modern Offices, Warehouses and Workrooms. Central Heating. —CHARLES A. TRICKS & SON, Auctioneers, St. Nicholas Street, Bristol.

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22-in. x 105-in. "LANDIS" Plain Grinder.
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10-in. x 24-in. WARD Universal Grinder.
BRYANT No. 6 Chucking Grinder, chuck range 12 in.
1924-make 6-WHEEL 12-in. LOCOMOTIVES (Barclays); copper firebox, brass tubes; 160 lbs. w.p.
10-ton "COWANS, SHELDON" LOCO. STEAM CRANE (1920 make); 23-ft. jib; lift 10 tons at 16 ft. radius; 100 lbs. w.p.; 4 ft. 8½ in. gauge.
VERTICAL BOILER, 14 ft. 6 in. high x 5 ft. 1 in.; re-insure 70 lbs. pressure.
FOUNDRY LADLES, various types and sizes.
About 3,500 ft. of NEW slightly stock-rusty 1½ in. dia. screwed and socketed Piping in the usual long random lengths.

(ASK FOR "ALBION" MACHINERY CATALOGUE.)

ALBION WORKS, SHEFFIELD.

MACHINERY—*Continued.*

SAND MIXERS. — New and Secondhand Ask us to quote.—W. BREALEY & COMPANY, LIMITED, Prospect Works, Hawksley Avenue, Sheffield.

PATENTS AND TRADE MARKS.

THE Proprietors of British Patent No. 224941 are prepared to sell the Patent or to license British manufacturers to work thereunder. It relates to the manufacture of wrought iron.—Address, BOULT, WADE & TENNANT, 112, Hatton Garden, London, E.C.1.

PROTECT YOUR IDEAS.—Free, Advice and Handbook on patenting inventions and registering trade marks by Registered Agent with 43 years' experience.—KING'S PATENT AGENCY, LIMITED, 146A, Queen Victoria Street, E.C.4.

MISCELLANEOUS.

SLAG.—Wanted, 100 tons weekly for six months of Heavy Slag, loaded into trucks on rails.—State full particulars and terms to Box 544, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

70 BARRELS CORE OIL, containing 90 per cent. linseed oil, £36 per ton, barrels free, f.o.r. Hull, subject to being unsold. Odd barrels supplied.—Box 554, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

GANISTER, best quality for cupolas, also for Steel Works.—ASTBURY SILICA COMPANY, "The Brooms," Park Lane, Congleton.

'Phone: 287 SLOUGH

CRANE LADLES

12 Ton STEVENSON	...	**£46**
10 Ton PENMAN as new	...	**£44**
8 Ton EVANS **new** ...	...	**£40**
5 Ton EVANS **new** ...	...	**£32**
3 Ton CONSTRUCTIONAL		**£24**
2 Ton McNEIL ...	...	**£21**
1 Ton EVANS ...	...	**£16**

All have usual Worm and Bevel Gear.

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BUY FROM ME AND SAVE MONEY

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(DARLINGTON)

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Two-Stage Compression in One Cylinder.
HIGHEST EFFICIENCY MAINTAINED AFTER YEARS OF WORK!
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Prizes for Observant Readers

ALTHOUGH a large number of replies was received to our advertisement inviting readers to point out the error in our page in the "Foundry Trade Journal" of May 22 last, no one appears to have noticed that the illustration of the cylinder should have been horizontal instead of vertical.

A number of readers, however, pointed out a slight error in the letterpress, where the words "inlet of" were used instead of "inlet and," and we have, therefore, decided to award the books to the six readers who pointed out this mistake.

Little mistakes of this sort may occur from time to time, but there is no mistake about the "Bradley Quality"—*that* never varies.

A copy of "Metallurgy of Cast Iron," by J. E. Hurst (Pitman, 15/- nett), has been sent to each of the following:—

B. N. JOLLY, MOSTON, MANCHESTER.
E. JONES, PENDLEBURY, "
J. RICHMOND, ARMADALE, WEST LOTHIAN.
J. STANWORTH, REMINGTON, CLITHEROE.
J. GARRITTY, ARMADALE, WEST LOTHIAN.
G. LUTON, ? GATESHEAD.

Bradley's REFINED
PIG IRON
"A QUALITY FOR EVERY REQUIREMENT"

BRADLEY & FOSTER LIMITED, DARLASTON BLAST FURNACES, DARLASTON, STAFFS.
Telephone: DARLASTON 16 (Private Branch Exchange). Telegrams: "BRADLEY, DARLASTON."

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GANISTER, CUPOLA BLOCKS, FIRE BRICKS,
FIRE CLAY.

Silica Bricks, Tuyeres, Stoppers, Nozzles, &c.

STEEL MOULDERS' COMPOSITION, SILICA CEMENT.

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THE LARGEST PLATE ROLL IN BRITAIN
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GLASGOW PATENT MOULDERS' BLACKING
Made only by
Cast by R.B. TENNENT Ld. Coatbridge for PORT TALBOT STEEL WORKS South Wales
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GEORGE JONES, Limited,

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Complete Rolling Mills for all Metals.

Machinery for Making Tubes and Wire.

MILL GEARING OF EVERY DESCRIPTION.

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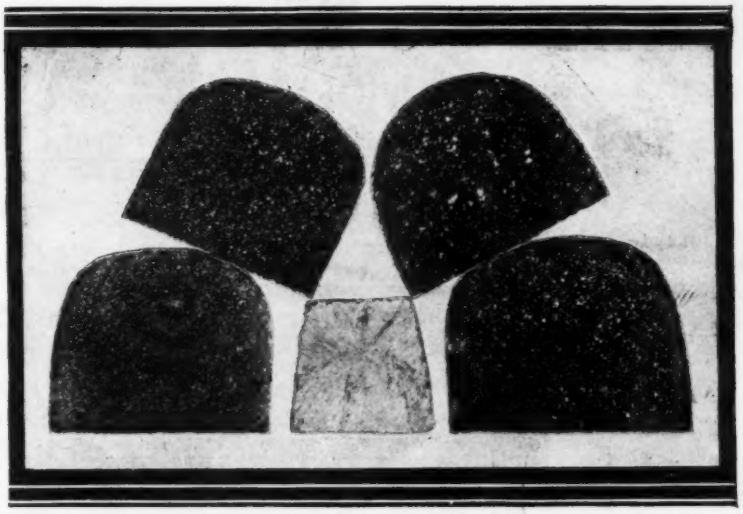

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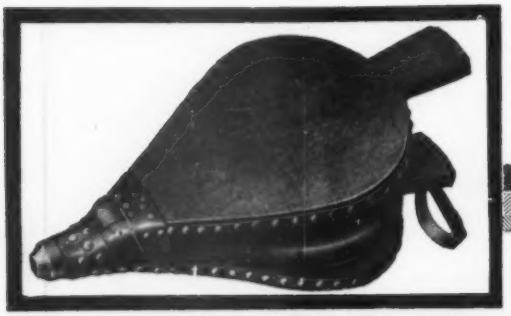

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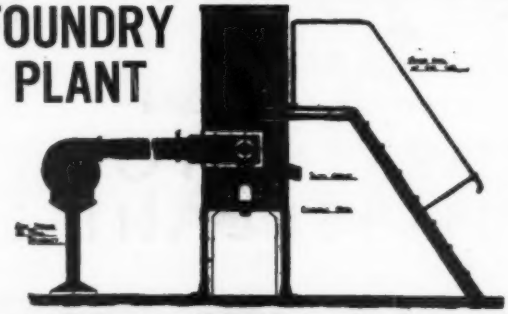

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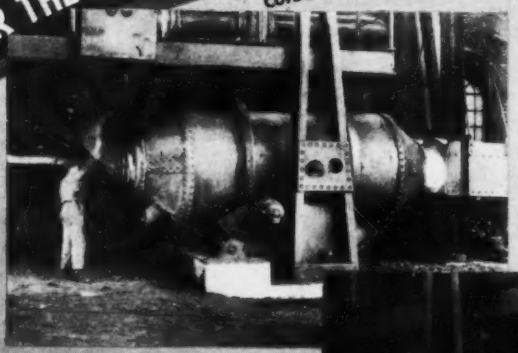

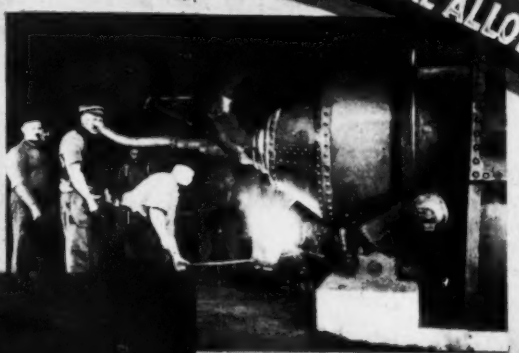

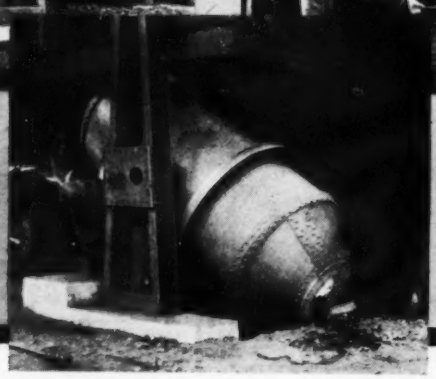

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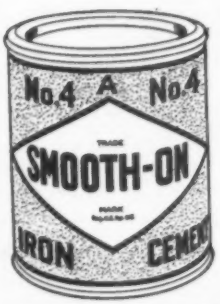

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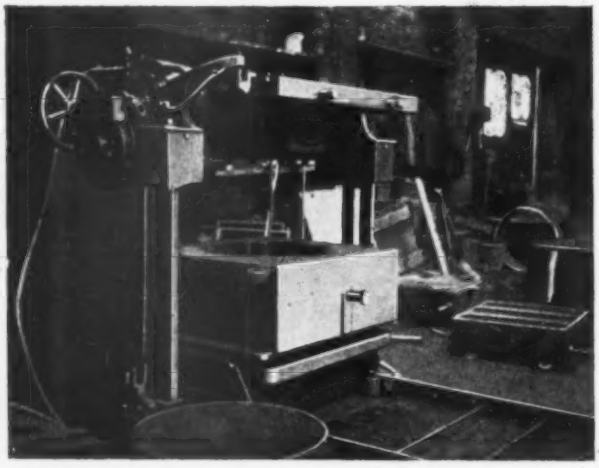

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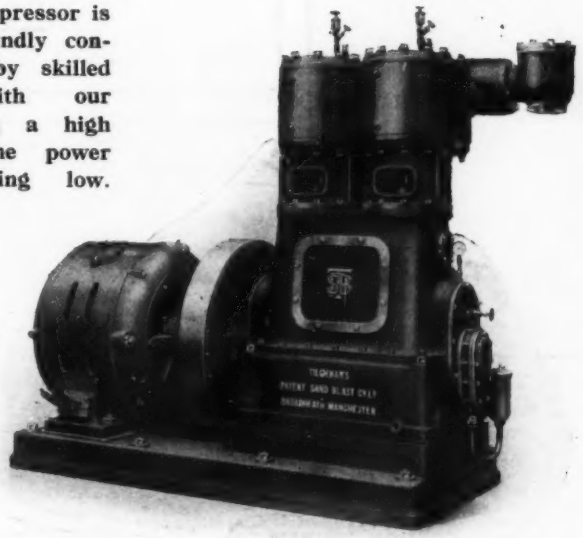

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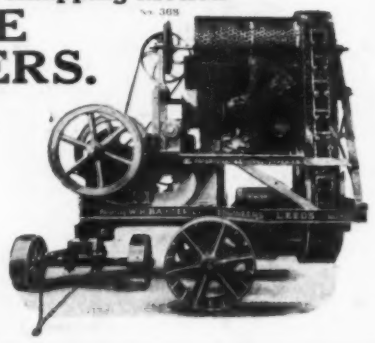

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